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The Talk of the Industry

» NOW THAT SECRETARY OF COMMERCE ROPER has taken up the cudgels in a genteel way against agricultural control for his home state, isn't it about time that Mr. Roper pointed out that the ultimate responsibility for current sizeable imports of Polish hams can be laid at

Secretary Wallace's door. At least we have a dim recollection that Mr. Wallace encouraged the slaughter of quite a number of small pigs a few years ago and now the meat packing industry is short of raw material.

» UNTIL WE CAN DISCOVER the correct spelling of Ku Klux Klan (or is it Ku-Klux Klan?), we will have to withhold our comment on Justice Hugo Black's fireside chat. A long time ago we once read a learned essay on Sciosophy—the science of organized ignorance. And when the Great Confessor announced very flatly that as far as he was concerned the K.K.K. monkey-business was all behind him, the idea would not down that the Great Confessor was one of Sciosophy's charter members.

» FOR ONCE, not one of the "wise-guys" has been able to tell a waiting world what was the reason stock market prices have gone down so far. And up to now we have not been inclined to stick our own neck out for the purpose of filling this gap in human knowledge of financial affairs.

» SPEAKING OF MARKET FLUCTUATIONS, one of the captains of industry of the highest repute in the land decided back in March that the "prices of commodities could go no way but upward." And now his firm is stuck with a huge inventory of cotton acquired at 14 cents per lb. The market at the time of writing is about half that figure, and the second largest crop on record is being harvested.

All of which goes to show that "reaching upward" for commodities or securities on borrowed money is a folly of epidemic proportions that afflicts the great majority of men—even the big shots. The time to load up beyond reasonable current requirements is when things are cheap, not high priced, but, alas, as most mature men know all too well, it takes more nerve to buy at the bottom than at the top. Never forget that.

In business, national or personal affairs the prudent policy of avoiding debts that cannot be repaid on a modest scale of operations leads to peace of mind—the greatest boon this life has to offer. And, if everybody were prudent, the ups and downs of business sentiment, which seem to initiate the spurts and lulls of business, would be effectively braked.

Debt for non-productive purposes is a chain to the past. Excessive debt is a curse for the individual, the business or the nation. And public debt soon becomes private obligation.

» SPEAKING OF THE SHORTAGE OF LIVESTOCK and consequent high prices for meats, the crooked smile of the month has been stimulated by the kosher meat strikes in New York. Loud lamentations over the high cost of prime ribs of beef and porterhouse steaks have greeted our ear during October. Humanity, it apears, will never learn that high prices for *perishables* are possible only because people—the consuming public—will pay and are paying those prices. As far as we know there is no known way to compel the public to pay any more for a perishable than it wants to. Fur-

thermore it is perfectly absurd to expect low dressed meat prices when farmers are receiving 15 to 20 cents per pound for live animals. So what?

» MILK A PUBLIC UTILITY? Milk distribution is not in fact a public utility business. But a very potent effort is being made by those of "progressive" tendency to give it such a characterization. They

may not seem to succeed generally; but they are likely to succeed in a measure sufficient to make attention to this problem one of general importance to all.

Not only is the milk distributor affected. Other food industries are likely to become involved. Thus the matter takes on serious aspects for all food manufacturers and processors. Here is the reasoning involved:

Any commodity or service of importance to practically all of the urban population takes on public utility characteristics. Such a commodity becomes important to the politician. And the very real importance to the public may be distorted or magnified by some partisan political issue, or reform effort, that is intended merely to get votes.

Washington notes this trend, and the astute long-visioned officials, not averse to riding such a hobby, have climbed astride. The milk industry is an unwilling horse. But it is not likely that even the most skilled management will be able to buck off all of the control and regulatory measures and officials that would like to ride.

This is *not* the place to prescribe specific remedies for the milkman's ills. The milk industry has several "physicians" already in attendance, and we hope they will find the proper potion. But this *is* a proper place in which to warn other food industries that they must not only watch this trend, but prepare their own business with due regard to it.

The most effective antidote for utility-itis will probably be a clean record of aggressive service at the lowest possible cost. An additional factor which cannot be regarded as negligible will be a merchandising program which takes the public into the confidence of the executive as to the source of major cost burdens. *The public must understand* that making a good food and shipping it from a factory is only a part of the job of getting it into the kitchen. This does not mean that merchandising is any more important than heretofore. But it does mean that public relations questions have acquired new importance for all producers.

A Dangerous Red Herring

WHETHER MR. ROOSEVELT was intoxicated with his own importance in world affairs or whether, as we strongly suspect to be the case, he was following the time-honored politicians' practice of viewing with alarm the enemies beyond the nation's borders just to distract public attention from domestic matters, the fact remains that his Chicago speech may prove to be a step toward very serious international complications.

Though he may have done it merely to defend his administration against the Black affair, it is not impossible that it may lead to rebuffs from abroad. And, all too often one thing leads to another. One nation cannot denounce another without expecting something in return, usually with interest. Then, unhappily, may occur a serious "incident," like blowing up the battleship Maine, and public opinion may demand redress. Wars often start that way. A murder in Sarajevo started the last big war. (Please note: *started*, not *caused*).

Benefit Checks for Consumers?

THE ASTUTE and personable Ben Marsh, of the People's Lobby, has just made an appeal to President Roosevelt which on its face is as liberal as all outdoors, but in its implications, as they are construed by conservatives, is as reactionary as the ten commandments. It is a double-barreled affair. One barrel demands a subsidy for consumers. It insists that the federal treasury shall make up to the consumer in regular checks something like the old (or new) AAA checks just the amounts that the various New Deal agencies add to his cost of living.

Without a word of criticism for the idea of paying farmers not to raise crops, and apparently conceding that the government owes it to the farmers to maintain prices high enough to assure them of the fruits of their toil, the petition insists that the increased prices should not come out of the hides of the consumers.

Hors d'Oeuvres

• A survey by Macfadden Publications reveals that in Fort Wayne, Ind., a city of more than 100,000 and not altogether untypical of American urban communities, 94.5 per cent of the families bake pies at home, 93 per cent bake cakes and 74.2 per cent bake cookies. Yet the baking industry thinks it's pretty good at getting available business! But let not preservers criticize. Jellies and jams are put up by 66.3 per cent of the families in Fort Wayne.

• *In the old days on the farm, granddad used to bury cured bacon in the oat bin so that it would keep better But that was an old fogey idea. Now farmers are being advised by University of Illinois scientists to dust bacon with oat flour to prevent rancidity and mold growth.*

• Professors of public finance in American colleges are overwhelmingly opposed to the levying of special taxes on margarine, according to the Tax Policy League. But what of it? The learned professors don't cast enough votes to give weight to their opinions.

• *WPA literary researchers on the subject of American slang and jargon find that "hounds on an island" are frankfurters and beans, "first lady" denotes spare ribs, and "scandal soup" is tea. Wonder if they have found a suitable definition for the slang term, "WPA worker?"*

• More than half the yearly intake of ice cream is eaten during the four warmest months. And "55 per cent of everybody eats before going to bed." (*True Story.*) So what? So the counter-freezer industry is trying to make "freezer fresh" ice cream a year-round food by popularizing it as an ante-snooze snack.

• *In 1554, Sir Walter Raleigh pilfered the potato from America, introducing it into Europe. In 1718, John Young and his son David, chased out of old Erin for their religious opinions, brought it back to America, cultivating it at Worcester, Mass. So the Irish potato did come from Ireland and didn't get its name from being thick skinned.*

• Bendix brakes have been installed on milk wagons by Borden. Now all that is needed is a horse with a clutch that the driver can throw out before applying the brakes.

• *Canned crow's meat was served at a recent conference of Independent Grocers Alliance of America. But don't get excited, it's not a commercial product. You see, a picture of lovely ladies eating crow's meat at a convention is always good publicity.*

• Sweet potato flour, selling at a few cents a pound and making baked products "undistinguishable from those made with wheat flour" has been predicted by scientists as a result of research by Chemical Foundation, Inc. If it is no different from something we already have too much of, why bother about it?

Some of the housewives who buy food at local groceries are actually a little further down in the underpriviliged class than the farmers. The higher prices caused by government interference with the law of supply and demand, Marsh implies, constitute a pretty heavy load on the family budget.

Then there is a polite inquiry about the ever-normal granary. Marsh and his aides want to know if the Henry A. Wallace plans for this institution are calculated on normal consumption, or whether they are calculated on the amount of farm products the country would consume *if prices were no object,*—if every man, woman and child in the nation could have all the milk, all the bread, all the meat and all the cotton for clothing they really need!

Which rather puts Mr. Wallace on the spot. Of course he calculates his estimates as to the ever-normal granary on consumption which may practically be expected—on products which can be sold, and sold at prices which yield the farmer a decent living. Anything else would play havoc with prices—ruin the farm program.

But it is asking rather much of the President, or Secretary Wallace, to acknowledge that their ever-normal granary plan actually contemplates that millions of people in this country shall not have as much milk, eggs, meat, grain and cotton as they need! In fact, a good Bolshevik might read the answer and insist that this is not a government for the masses, but for the Kulaks!

Big Crops—New Problems

BUMPER CROPS IN 1937 bring with them a train of changed circumstances and conditions in the food industries which constitute pretty much a tale of woe. The tale is long; only its high spots can be illuminated.

As a direct result of the price decline due to the huge cotton crop and loss of our export markets because of AAA restrictions, the South will lose much of its recent buying power for northern foods and will be forced to go further and further into the inevitable process of feeding itself. In view of this, the wheat situation is particularly significant.

During the 1936 crop year, when the nation was importing wheat, the price of wheat in the Southwest (Texas, Oklahoma, Kansas and Nebraska) was in general the Kansas City price less freight. At times it was the Chicago price less freight, as it was generally for the Northwest states of Minnesota, the Dakotas and Montana.

Now that the U. S. is again exporting wheat and flour, the effective price-base of flour has suddenly changed to—of all places—Texas ports. Texas buys its wheat on a price-base of so much over the Chicago option price, f.o.b. the Gulf ports. As long as the usual 11 cents per bushel differential existed between the Chicago price and the Kansas City price everything was O.K. But early in the 1937 crop year, that differential fell to 3 cents or less per bushel which gave Texas flour millers an advantage of about 45 cents per barrel of flour over the Kansas and Oklahoma millers.

Texas had the first marketable wheat of the 1937 crop year. As soon as Texas flour millers realized the size of the new crop, they pressed the advantage of all-water shipping rates to Gulf and Atlantic seaboard points. And they have grabbed all the available business they can handle, mainly to the disadvantage of Kansas and Oklahoma millers. Apparently Chicago Board of Trade prices are an important factor in Kansas and Oklahoma but not so much so in Texas—not while Texas is still on deep water. Kansas and Oklahoma millers are trying to hold their trade to the best of their ability but are compelled to equalize the rail freight with the Texas water rates.

Northern millers of hard spring wheats are in a much better position than Kansas millers of hard winter wheats, though Nebraska and Oklahoma millers are in an intermediate position. Northern millers will benefit decidedly from their past good merchandising work.

Add to the foregoing problems, the fact that prices of feeds, the byproduct of milling, have gone to pot, and you have a moderate notion of some of the problems of the food manufacturer in a year of huge crops. Feed prices are low for two known reasons: shortage of livestock to eat the feed, and better than average pasture conditions during the summer.

Livestock presents a case with "reverse English." Though livestock is short in this country, the tendency of the farmer is to hold back animals longer when feed is cheap, and to sell them more quickly when feed is dear. The farmer, as a class, has very little market for his homegrown feeds except to feed animals and then sell the animals. So the low-priced feed problem of the miller aggravates the immediate problem of the meat packer who, today, is faced with a shortage of essential raw material. His volume is down, his unit costs are high, consumers are raising hell about the high cost of meats; and Cudahy, for example, is forced to omit its preferred dividend.

There doesn't seem to be very much that anyone can do about it, though President Roosevelt seems to think a special session of Congress will find a solution. But efforts to reduce manufacturing costs are more in need than ever.

A Farmers' Bonus

PRESIDENT ROOSEVELT has returned from the Far West, feeling sure that Congress will cooperate with him in a new crop-control law, as well as in legislation for wage-and-hour standards. He says so confidently. And these forecasts are of large importance to food manufacturers.

Secretary of Agriculture Wallace has also been touring to feel the pulse of the nation. And he, too, has announced some of his conclusions. This announcement affords a sound basis for appraising the legislative plan which will determine Uncle Sam's part in regulating agriculture. And, lest anyone forget it, we emphasize again that regulating agriculture regulates the raw-material supply for the food industries.

In its essence, the new Administration policy promises agriculture a bonus. And, unlike the soldiers' bonus granted a year ago, this is to be a continuing annual affair. It will range from half a billion to a billion dollars per year, according to the best prevailing guesses. And somebody has got to pay this bill.

The President and the Secretary agree that food prices must not rise. This would be comforting to food manufacturers, if it did not imply that the extra cost of the bonus for agriculture would have to come out of manufacturers' mark-up. No Administration spokesman has yet explained all this, much less given it an adequate or reasonable defense. But it is clear that processing taxes are to be used to fill the Treasury at Washington in order that the farmers may get their annual reward.

"Parity income" is the latest slogan. And this can be achieved only

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HIRING LABOR *BY THE YEAR*

Plan in effect at Hormel plant provides employment assurance, speeds production and results in better workmanship

Labor problems are second to none among the headaches of industry. Industrial relations experts have been advocating unemployment insurance, vacations with pay and other arrangements to improve the lot of the worker and to take some of the uncertainty out of his livelihood. Labor organizations have been demanding, and getting, various concessions for workingmen. What the future holds is problematical, but the trend is toward more favors for the man in overalls. Something new and unusual in the way of a means of handling the labor problem has been in effect at a large midwestern packinghouse since 1933. How it is working out is information of practical value to

All Food Manufacturers

UNEMPLOYMENT INSURANCE is actuarily impossible for the individual manufacturer. But there can be employment assurance, at least to a degree far beyond that commonly supposed. Geo. A. Hormel & Co., Austin, Minn., realized this and in 1933 decided to do something about it. What it did was to put into effect a "straight-time" plan by which the pay is not an hourly rate but a weekly salary. And this salary is assured for a year by a contract between the company and the employee.

Offhand, such a system would seem economic suicide for a manufacturer in such a seasonal business as meat packing. The employees must be paid the same weekly salary whether they work 20 hours a week or 40. But the plan is not suicide, as Hormel has definitely demonstrated. The secret of its success lies in knowing how many man-hours of labor will be required during the year before the year begins. To know this, of course, management must know what the year's production will be. But even if production falls short, there is a safeguard. The contracts contain a clause specifying that pay for work not done is to be repaid by extra work in the next three years. It is a kind of labor-credit plan.

In its inception, the Hormel plan did not include the pay-back clause. For ten years previous to 1933, the flow of livestock to the plant was about the same each year. So, although the amount of work in any one month was difficult to predict, it was simple enough to determine the basic number of employees needed to do the work during the year. But there came a drought in 1934. This curtailed the supply of hogs in 1935, and Hormel found that the abattoir gangs were not very busy, that all weeks were light weeks. In planning for the next year, the company could have reduced the labor gangs by half and made the same type of contract as before, but employment assurance is made of sterner stuff. Instead, the company hired the same gangs for the same hours, and inserted the loan-and-repay clause in the new contracts.

There is no doubt that this plan has adversely affected profits these past few years because of the abnormally low supply of hogs. Hormel is overpaying its largest labor units, those in the pork departments. But this employment assurance is a long-time plan. And it is expected that the labor costs will average out in the years when more hogs go to market. So costs should be proportionately lower in the last year or two before 1939. Then, there are other things than profits involved, as we shall see later.

At the moment, let's see what actually happens under straight time at Austin. Before the new fiscal year begins and the labor contracts are signed, Hormel collects the most accurate information available in the way of forecasts of livestock supplies and sales for that year. With this and figures on normal volume as a guide, it budgets production for the year. In the hog-killing and cutting departments, last year's budget was 1,300,000 animals. In a sausage department, it was about 5,000,000 lb. And so on. Experience tells what these figures mean in terms of man-hours of labor, and simple arithmetic gives the labor cost. This cost the company agrees to pay in 52 weekly installments.

Although almost all of the departments are now on straight time, the plan is not compulsory. The plant-wide acceptance of straight time has been a gradual growth since its first installation in one department in 1933. If employees in a department want their weekly pay assured, they must ask that the system be applied to their department. Fifty-two of the 56 departments in the plant have been granted straight-time contracts. Two have not asked for it. They are piecetime departments. Of the total number of employees, about 92 per cent work by the year.

There are a few departments in which the employees figure they have little to gain under the plan. The small beef-rendering gang is one of the few departments clinging to the hour employment. Its volume is fairly steady anyway, so its members figure the steadiness of straight time not so much of an asset. They want long hours if they can get them.

Not so with employees in the hog-killing and cutting departments. The supply of livestock to these departments is fraught with sharp peaks and deep valleys. Instead of being

assured steady work on an hourly rate basis, the laborers know they will have to face short weeks when the pay check won't cover living expenses. Straight time means a lot to these men, and they know it.

Coming in between the beef and pork departments in regularity of work is the sheep gang. The supply of sheep is more even than that of hogs, but not so regular as that of beef. So, this gang is somewhat uncertain of which plan is the better for it. It tried straight time but has gone back on the hourly rate, believing that there will be enough overtime to more than offset the short periods. But it is the guess of the management that, when the supply of sheep falls off again, the straight-time plan will pay the more money.

The results of the Hormel system are interesting. The management was a little surprised to find how much more quickly a gang could do its quota of work for the day when the men realized that they could go home when through and still draw a full pay check at the end of the week. It was a bit amusing, in fact, when the men complained that the conveyors which paced their work were too slow. The same conveyors at the same speed had been called too fast in the days before straight time. This speeding up, however, occurred in the first few weeks the departments went on straight time, the workers invariably finding shortcuts that would enable them to work faster, finish quicker and go home earlier. But after that initial spurt, the pace settled down to a steady gait. The Hormel company has not increased budgets to offset this faster work, so the gangs have gained in increased leisure or in bonus checks from their own speed.

What happens when the employees work faster but have a large volume to handle and so are kept full time week after week and month after month? To take an example, the sausage department exceeded its budgeted production of 5,000,000 lb. by about 2,000,000 lb. in 1936. And when it became apparent that the budget would be greatly exceeded, it was arranged to pay the workers two checks instead of one for the remainder of the year. One check was for straight time, and the other for the excess production. There was a problem involved in calculating this bonus, however. It happened that the management had made certain changes in the plant and equipment which would have increased production without any extra effort on the part of the men. So the pay was based upon the extra man-hours needed under the improved conditions.

The men in the cutting room at the Hormel plant find it of great advantage to work by the year, because there are sharp peaks and valleys in the supply of hogs. In this department some 134 men cut and trim 840 hogs an hour without working under strain

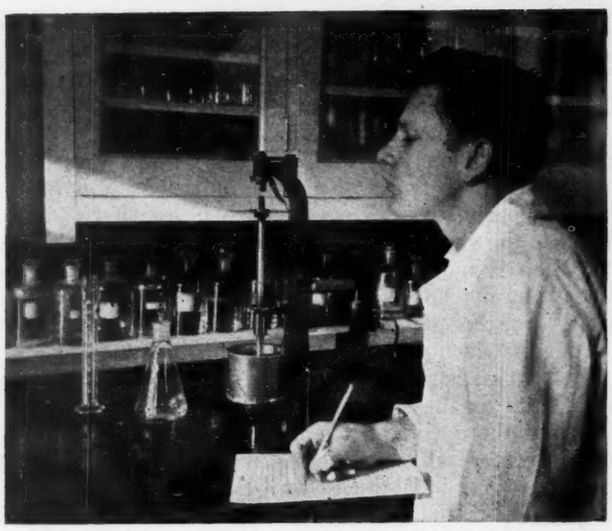
IN ADDITION to assured pay and bonuses for extra production, the Hormel employees on straight time have the benefit of six holidays a year and six days of vacation with no deductions in pay. The value of these benefits to the individual worker is obvious.

But where does the company come in for any gain under the straight-time plan? It gains in various ways. The job is made more desirable to the employee, and he wants it more. Therefore, he is a better worker. Then, the curse of on and off labor is put to one side. This curse is, among other things, that the good man who is laid off may find a steady job elsewhere, while the poor worker is almost sure to come back. Furthermore, when a department becomes rushed and green hands must be added to carry the load, time is wasted in teaching these men their jobs, the general level of the work pulled down to that of the green hands. On straight time, the old experienced men work faster and longer in case of a rush. This gets the work done much better in these times. And when there are absentees in a department, the gang usually elects to do their work for them, because the gang gets credit for the additional production. The salary for the absentee goes into a "kitty" to be divided evenly among all the men in the department.

Straight time is not a panacea for all unemployment ills, because when production definitely falls off, as during a prolonged depression, men would be laid off when their contracts expire. But the system does level out peaks and valleys of employment. If widely used, it would prevent widespread "firing" at the first threat of depression, with consequent lowering of public buying power and real depression.

In the past several years, Austin, Minn., has been listed by a statistical service in New York as the second most prosperous city in the country. Perhaps the doctrine of labor assurance at the Hormel plant has something to do with this.

Accurate knowledge of chocolate coating viscosities helps manufacturers establish customer good will and may serve as aid to the lowering of production costs



Determining "COVERAGE" VALUE of Chocolate Coatings

Viscosity determined at 95 deg. F. under proposed conditions gives more reliable indication of confection-center-covering value than when determined at higher temperatures.

By LEO FREUNDLICH
Hooton Chocolate Co., Newark, N. J.

VISCOSITY OF CHOCOLATE, as such, under any set of conditions is of little interest to anyone in a candy or chocolate manufacturing plant, a bakery, or an ice cream plant. However, every user of chocolate as well as every chocolate coating manufacturer, who wishes to get and to keep the good will of his customers, does want a measure which indicates the "coverage" of chocolate coatings. By "coverage" is meant the weight of product coated by a unit weight (for instance, by 1 lb.) of chocolate coating deposited under actual conditions of making chocolate-coated products on a factory scale.

In practice, the viscosity of a coating can be an index of its "coverage" value and, to that extent, it is of interest to users and makers of chocolate coatings.

If this "coverage" index, as determined with the MacMichael viscosimeter, is to have industry value, it is desirable that a universal method of determining the viscosity of chocolate coatings be followed and that results be reported in the same terms by everyone. Such a method to be universally acceptable must serve its purpose better than any other method. It must be suitable for testing all types of chocolate; must cover a wide range of viscosities without necessitating a change in the conditions of the test; must be simple and permit speedy operation; and must call for conditions that are practicable within the limits of the instrument. Results obtainable with this method must be reasonably accurate so that they can be duplicated easily by various operators.

The method proposed in this article meets these requirements to the extent that viscosities of chocolate coatings can be duplicated with it within one degree MacMichael for the low viscosities and within two degrees MacMichael for the higher viscosities when determined by different operators. When the same instrument is used, different operators usually get the same results for the same sample

The proposed conditions for carrying out the test are: 1, that the temperature of the chocolate coating be adjusted to 95 deg. F. (35 deg. C.); 2, that the determinations be made with a 7 cm. diameter cup; 3, that a 2 cm. diameter cylindrical plunger and a No. 24 wire be used at 35 r.p.m. under 3 cm. immersion. In the case of ice cream coatings the only change made in the conditions is that a No. 28 wire be used.

In setting these conditions for carrying out the test, consideration must be given to the fact that 99 out of 100 tests are carried out as factory control tests during the manufacture of the chocolate coatings. At such a time the temperature of the chocolate and the temperature of the sample received by the plant laboratory are usually above 95 deg F., or even above 100 deg. F., the testing temperature proposed by two other groups of investigators[2, 3].

It is evident that the viscosity determination must be carried out at a temperature as close as is feasible to the temperature at which the chocolate is applied to the candy centers, if the viscosity is to be an index of "coverage."

Zenlea[1] states correctly that "from a practical standpoint the viscosity should be determined at about 90 deg. F." and points out the difficulties of determining it at this temperature. It is reasonable to conclude that from

a practical standpoint the viscosity should be determined as close to 90 deg. F. as is possible. At 95 deg. F., my proposed testing temperature, the large differences in viscosity for temperature changes and possible liberation of latent heat due to the beginning of the freezing of cocoa butter do not occur.

I do not concur in the opinion that "a chocolate that has the lower viscosity at 130 deg. F. will have the lower viscosity at 90 deg. F."[1] The varying moisture content of chocolate is apparently the most important reason why the viscosity of a chocolate coating at a high temperature is not a reliable index of its "coverage" at 90 deg. F. The closer the testing temperature is to the temperature at which the chocolate is used, the smaller is the error due to a varying moisture content of different lots of chocolate when testing them to determine their "coverage" value.

On the basis of many years of experience, I have found that the results of the viscosity determination can be easily duplicated by different operators, if properly carried out at 95 deg. F. The differences for temperature deviations are small because the temperature can be easily maintained for the short period of time required for an experienced operator to carry out the test. The greater the difference between the temperature of the chocolate and the room temperature, the more difficult is the task of maintaining the temperature of the chocolate.

In respect to the other conditions of the proposed universal test, I found, when first working with a MacMichael viscosimeter, that obtaining and maintaining a constant speed at 20 r.p.m. was almost impossible with the instrument I had. The same difficulty was experienced with another instrument out of four used thus far. Others may have experienced similar difficulties which may account for the wide variations in the results obtained by different laboratories previously reported.[3] In view of these difficulties I recommend a speed of 35 r.p.m. because of the ease with which that speed can be maintained with all instruments used by me. Whenever the instrument was used frequently, its speed was checked two or three times during a day for any adjustments that might be necessary.

The temperature at which the test shall be caried out and the speed at which the revolving platform of the instrument shall run are not the only factors that must be taken into account. Assuming that a 7 cm. cup and a cylindrical plunger of 2 cm. diameter be adopted as standard there still remains the selection of the wire and the depth of immersion so that a wide range of chocolate coatings, as they are sold and used, can be tested under the same conditions and their viscosities expressed in the same terms.

My experience shows that a No. 24 wire and a 3 cm. submersion of the plunger meet these requirements except in the case of ice cream coatings. In that case a No. 28 wire is used with all other conditions remaining as when a No. 24 wire is used.

Use of a No. 24 wire offers advantages over the use of thinner wires by others in that it is sturdier and does not easily kink or otherwise become defective. If the No. 24 wire is not used appreciably above 200 deg. MacMichael, the same wire may be in use for a year or longer even though it is used frequently every day. When other methods for determining the viscosity or "coverage" of the chocolate are used in addition to the MacMichael viscosity determination, about once a month is sufficient frequency for direct checking of the wire. When the MacMichael viscosity determination is the only method used, more frequent checkings of the wire may be desirable. Once a week has been suggested.[3] During seven years I have never found a No. 24 wire unfit for continued use, unless it developed a defect which could be clearly seen.

Adjustment of the temperature of the sample to 95 deg. F. for testing is not a difficult matter. According to our experience, the testing temperature may be reached from a lower or a higher temperature as long as the sample is completely melted and as long as the temperature to which the chocolate is heated is not excessive. Plain chocolate may not be heated above 130 deg. F., milk chocolate must not be heated above 115 deg. F.

When the temperature of the sample is below 95 deg. F., as in the case of testing a sample of molded chocolate, it is advisable to heat more of the chocolate than is actually needed for the test and to heat it to 105 to 115 deg. F. until the chocolate is completely melted and then cool to the testing temperature. This procedure assures complete melting in a short time and quick preparation of the sample for testing. For 3 cm. submersion about 200 grams of chocolate is melted in the 7 cm. cup by placing the cup in a 400 cc. beaker containing hot water and, if necessary, heating the beaker with any suitable heating device and so as to avoid getting water or condensed steam in the cup containing the chocolate. For 4 cm, submersion about 230 grams is melted. (About 180 grams is actually used for 3 cm. submersion and about 210 grams for 4 cm. submersion.)

CHOCOLATE above the testing temperature is cooled slowly to 95 deg. F. by dipping the cup for a moment from time to time into cold water and stirring constantly with a thermometer to get uniform temperature throughout the mass before dipping into the cold water again. In case any water accidentally gets in the sample must be discarded.

When the 95 deg. F. temperature is reached, the cup is attached to the viscosimeter; a spoonful or two of the chocolate removed into a spare cup to be kept at 95 deg. F. in a 400 cc. beaker containing warm water; the plunger warmed quickly by turning it over a hot plate or in a Bunsen flame; the plunger dipped into the chocolate in the cup to prevent formation of any airpockets; the wire attached; the chocolate brought up to the level at which the reading is to be taken, while the cup is rotating, by adding from the spare cup in the warm water; and the reading taken. When the viscosity is very high, the chocolate in the rotating cup tends to recede from the plunger. By

(*Turn to page 676*)

References

1. Benj. J. Zenlea, Cocoa and Chocolate, June 1935.
2. K. E. and J. P. Langwill, Cocoa and Chocolate, May 1936.
3. Robert Schwarz and W. S. Hubbard, Cocoa and Chocolate, June-July 1936.

▶***Use of the viscosity of chocolate coatings as an index of their "coverage" values is merely a specialized example of laboratory-test results being translated into a measure of factory performance.***

The method by which this yardstick of performance is obtained has special value to manufacturers of

Chocolate-covered baked foods,
Chocolate coatings,
Chocolate-covered candies,
Ice cream pies or bars,
Hollow Chocolate Products
Thin chocolate bars.

Decline in WHEAT CONSUMPTION *Halted*

By research, wheat flour industry stops inroads made by other foods on the per capita consumption of flour. Bakers will benefit if they coordinate their research with this effort

By E. G. MONTGOMERY *
Washington, D. C.

DURING THE PAST TWO YEARS the wheat flour industry has begun to see encouraging results for its efforts to halt the downward course in the per capita consumption of its products, bread and cake flours. There is some indication that it is even regaining some of the ground that flour lost to other foods.

For more than 30 years the per capita consumption of flour in the United States took a definite downward course. According to studies made by the Food Research Institute of Stanford University the per capita consumption of flour in 1902 was slightly less than 230 lb. In 1934 the per capita consumption was 160 lb., a decline of 30 per cent, nearly 2¼ lb. per person per year for each year of the 32-year period.

Studies by the Millers National Federation show that in 1935–36 the per capita consumption of flour was 152 lb., the same as for the 1934–35 crop year and that the 1936–37 crop year raised the ante to 153 lb.

Frank acknowledgment that cereal products were losing ground in the battle among foods for a favored place in the human dietary was the start of the fight by wheat flour producers to regain the consumer popularity that had been theirs.

How to carry on the fight, what strategy and tactics to use, and through what agencies to work were the decisions which had to be made when once the flour industry faced the facts that its products were victims of the competition of one food with another.

This competition among foods is a type of competition that is ruthless in its action and persistent in its duration. No casual method of combatting it can hope for success. In comparison, the competition between products in the same branch of food manufacturing or processing is gentle and very temporary. A change in sales policy, in method of packaging, in physical appearance, or in method of processing may be sufficient to reverse the competitive relation between similar products of different concerns in the same line of manufacture.

Such is not the case in the competition among foods. This latter competition has its roots in the eating habits of people as a mass and, to a large extent, there is no accounting for these changes. Some of the changes are brought about by long-time pressure of economic changes in the life of the people; their ability to pay for the different foods that will meet their dietary needs. Developments in transportation, use of refrigeration, and adoption of other means of breaking down geographical barriers to extensive marketing give rise to some of the changes in eating habits.

One highly important influence in bringing about these changes is the working out and adoption of better technology for the preparation of foods for human consumption. This factor is evidenced by the new products that come onto the market, by the new forms in which formerly unpopular foods arouse consumer interest, and by the improvements made in flavor, texture, or keeping qualities of foods previously favored with a local or restrained consumer demand.

These are only some of the forces against which cereal foods had to contend in their struggle for their place on the consumers' dining tables. They are the forces that give all manufacturers and processors of foods reason to raise the questions, "What do others do about this competition among foods?" "How do they dull the blades of the competitive-commodity axes that threaten to cut off their industrial heads?"

There was a time when the bulk of our diet consisted of a few simple foods such as bread, meat, potatoes and apples. During the past 30 years, all of these foods have had severe competition from new foods to tempt the human palate. Even though the per capita consumption of foods in terms of calorie-intake has not changed very much over this period, there has been a marked increase in the use of sugar, vegetable oils, preserved and canned foods, and fresh fruits and vegetables at the expense of the old standard foods. The fruits and vegetables eaten have increased greatly in variety as well as in quantity consumed.

Producers of wheat flour gave impetus and direction to the studies that brought out the facts tabulated in the table entitled "Changes in the Consumption of Foods."

In its efforts to combat the trend clearly set forth in this table the wheat flour industry has fostered research work for the improvement of the wheat from which flour is made. Special emphasis has been placed on the making of better flour and bread.

Through the agencies of the U.S. Department of Agriculture and state experiment stations an effort has been made for the past several years to develop new strains of wheat by selection and hybridization, to improve cultural methods, soil management, and use of fertilizers, and to improve the technic of milling the

* Based on "Report on Wheat and Flour Research" made for the Wheat Flour Institute by E. G. Montgomery, formerly head of the Foodstuffs Division of the Department of Commerce, Washington, D. C.

wheat into flour and baking the flour into bread.

Organizations of technical workers participating in this work are:

American Society of Agronomy,
American Association of Cereal Chemists,
Official Agricultural Chemists,
Tri-State Soft Wheat Improvement Association (Ohio, Indiana, Michigan),
Cooperative Regional Improvement Program (Minnesota, North Dakota, South Dakota, Montana),
Northwest Crop Improvement Association,
Cooperative Winter Wheat Improvement Program (North Dakota, South Dakota, Minnesota, Montana, Wyoming, Colorado, Nebraska, Kansas, Oklahoma, Texas),
Cooperative Western Wheat Improvement Program (eight western states).

Some phases of the work are carried on in: 1, state milling and baking laboratories such as are maintained in Minnesota, North Dakota, and Montana; 2, state college laboratories as represented by Kansas, Nebraska, Minnesota, Illinois, Ohio and several agricultural colleges; 3, laboratories of flour milling companies working cooperatively; 4, laboratories of companies in affiliated industries such as yeast growing, chemical manufacture, and flour mill and bakery machinery manufacture; and 5, special institutions such as the Food Research Institute located at Leland Stanford University.

The work done by the various experiment station laboratories covers a wide variety of subjects ranging from wheat improvement to staling and flavor of bread.

Regional projects supported by the various improvement associations and cooperative programs had largely to do with the breeding and development of wheats for the regions covered by the individual improvement association or cooperative program.[6]

Food Research Institute, Leland Stanford University, has made studies and reports on (*a*) flour consumption, (*b*) manufacture and distribution of bread, and (*c*) stale bread.[7]

Committee on Bread Studies, U. S. Department of Agriculture, has given particular attention to the quality and flavor of bread as affected by various ingredients entering into bread under controlled conditions.

Other organizations and groups have been studying the technic of milling wheat into flour and of making the flour into bread to determine commercially as well as experimentally the best methods and technology to follow to get better flour and better breads and cakes as finished products. These studies are carried out in experimental mills and bakeries to get the most promising results before proceeding into the plants on a commercial scale.

Studies of this nature are supported by flour milling companies, baking companies, and yeast, chemical, and equipment making companies to, very probably, the extent that government agencies do. Appropriations of state colleges and U. S. Department of Agriculture for these studies run from $300,000 to $400,000 per year exclusive of land, buildings and equipment in use. In addition a Wheat Flour Institute, sponsored by the Millers National Federation, has been operating since June, 1935, on a three-year program to promote a greater consumption of wheat flour products.

This institute is supported by the flour milling industry and has the function of carrying on an educational, advertising and merchandising, and general promotional service program to attract consumer attention to the nutritional value of wheat flour products.

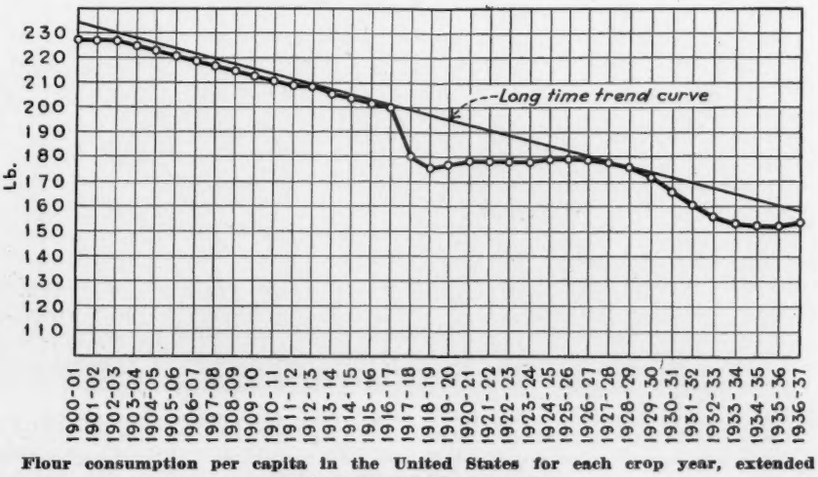
The present day results of all these activities in behalf of wheat flour and wheat flour products has been, temporarily at least, to slow up and possibly to stop the crowding of wheat flour products out of the human dietary by other foods.

The weakest spot in the program appears to be the lack of coordination and direction of research activities for the actual making of the best quality and consumer-attracting products from wheat flour. Here is an opportunity for the baking industry to coordinate its research activities with those of the milling industry.

Changes in the Consumption of Foods
(U. S. Department of Commerce Report No. 9091)

Foods	Per capita consumption in pounds (calendar year)			
	1899	1931	Pounds Change	Per cent Change
Wheat	222.2	170.7	− 51.5	− 23.18
Cornmeal	103.3	21.3	− 82.0	− 79.38
Rye flour	4.6	2.4	− 2.2	− 47.83
Buckwheat flour	2.9	0.3	− 2.6	− 89.65
All cereals	341.2	206.9	−134.3	− 39.36
Dressed meats	142.8	133.2	− 9.6	− 6.72
Sugar	61.0	98.5	+ 37.5	+ 61.47
Vegetable oils	2.0	12.0	+ 10.0	+500.00
Animal fats and oils	14.2	17.5	+ 3.3	+ 23.24
Canned fruits	2.3	10.6	+ 8.3	+360.87
Dried fruits	1.3	5.2	+ 3.9	+300.00
Fresh fruits	151.8[1]	172.7[3]	+ 20.9	+ 13.11
Canned vegetables	10.3	28.4	+ 18.1	+175.72
Fresh vegetables	222.0[2]	284.0[4]	+ 62.0	+ 27.93

[1] More than 60 per cent were apples.
[2] White potatoes, sweet potatoes, and dry beans.
[3] About 40 per cent were apples.
[4] About 70 per cent were white potatoes, sweet potatoes and dry beans.



Flour consumption per capita in the United States for each crop year, extended to include 1936-37 crop year.

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BYPRODUCTS OF MILK

PART II

Conversion of calcium lactate to lactic acid and production of whey powder

(Continued from October FOOD INDUSTRIES)

By L. V. BURTON
Editor of FOOD INDUSTRIES

Tradition has it that food raw materials must be used to produce foods. Yet logic and current events tell us that many food materials can be converted profitably into other materials of higher value. This is the basis of the Farm Chemurgic movement. Hence the story of milk byproducts fits into the forward looking scheme, and should afford an inspiration for
All Food Manufacturers

THREE GRADES OF LACTIC ACID commercial, edible and water white lactic acid are produced at Sheffield By-Products Co. Each is made from calcium lactate of different degrees of refinement.

Commercial acid is made from concentrated crude calcium-lactate liquor as it comes from the vacuum pan after the first evaporation. This liquor has never been crystallized and hence it contains many of the so-called impurities that come from the whey.

Edible grade of lactic acid, which is commonly used in food manufacture, starts with washed, solid, crude calcium lactate as it comes from the centrifuge after the first crystallization. Because it has been thus treated, it is much purer than the crude liquor. In passing, it should be remarked that the term impurities refers here only to those substances other than calcium lactate which come from the milk—not to deleterious substances.

Water white lactic acid is of such a high degree of purity that it must be made from U.S.P. grade of calcium lactate. Usually it is taken wet from the basket of the centrifugal, just after washing, although dry U.S.P. calcium lactate may be used just as well. But it costs more because it has been dried.

Steps in the production of each grade of lactic acid are now to be described.

Commercial-grade Lactic Acid

Concentrated crude lactic liquor at 13.5 deg. Beaume is pumped from the vacuum pan to a wooden mixing tank where decolorizing carbon is added. Then it is acidified with electrolytic grade of sulphuric acid to a very slight excess acidity. Also at this point are added suitable chemical reagents in exact amounts to remove any heavy metals, such as iron, by forming a very insoluble precipitate that can be filtered out. After thorough mixing, the liquid is pumped through a rubber hose to the upper tank of a General Ceramics Corp. vacuum filter (see Fig. 12) and is filtered slowly to remove the fine particles of calcium sulphate and other precipitate. The latter is ultimately thrown on the dump, for there is never enough of it on hand to warrant manufacture of anything from so cheap a material. After washing the cake on the filter, the filtrate and washings comprise a solution of lactic acid of about 22-per cent concentration.

This acid needs one more purification before it is suitable for sale as commercial acid. Hence it is pumped to a wooden storage tank and held until the necessary equipment for purification is available or free from other uses. Next it is concentrated by vacuum evaporation in a stainless-steel vacuum pan to 22 deg. Beaume, which is equivalent to 50 or 60 per cent lactic acid of this grade of purity. It goes then to the top tank of the vacuum filter, more Norit is added, and lime or sulphuric acid is next added to bring the calcium and sulphate into exact balance—which is a job for a food engineer or a chemical engineer, not for an ordinary workman. There the same reagent to precipitate any remaining heavy metal is added and in the exact amount needed. It is now filtered on the vacuum filter, the cake is washed and then discarded. From here it is pumped into glass-lined tanks for diluting to the exact strength which the trade demands, usually 50 or 44 per cent strength, after which it is put in wood barrels

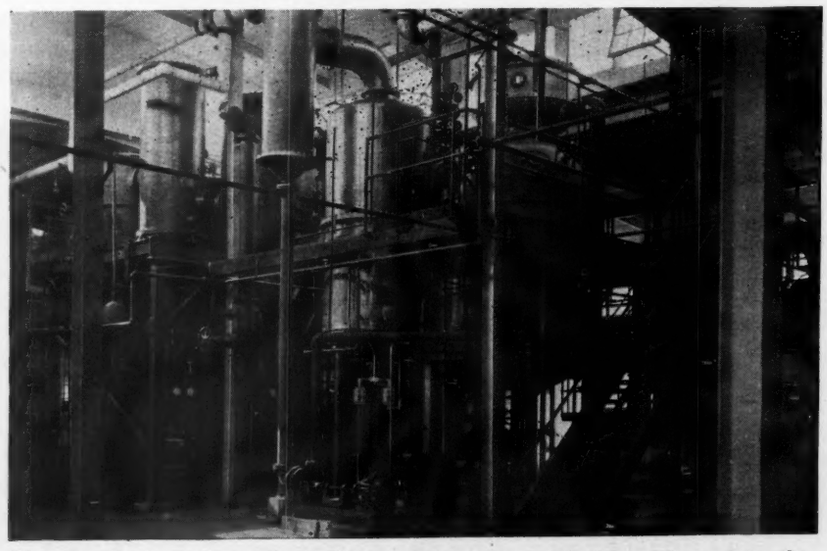


Fig. 11. The byproduct milk business needs many evaporators. The one in the foreground is made of stainless steel for the concentration of lactic acid by evaporation. The double effect evaporator in the left background is for concentrating whey for whey powder manufacture.

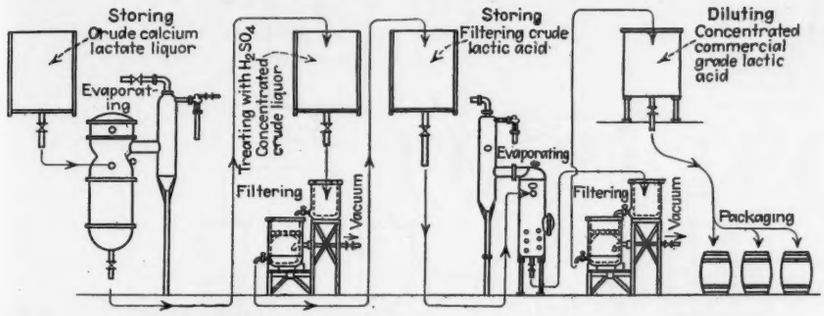


Fig. 8. Flow diagram for production of commercial grade of lactic acid.

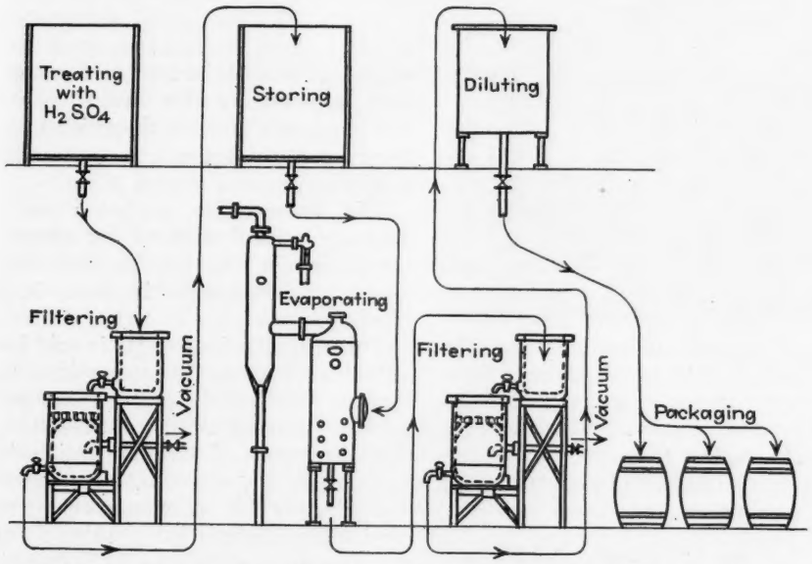


Fig. 9. Flow diagram for production of edible grade of lactic acid.

for sale as commercial lactic acid.

Yield figures are discussed together under water white lactic acid.

Edible-grade Lactic Acid

In producing edible-grade lactic acid, the starting material is wet, washed, crude calcium lactate from the centrifuge. In a wooden tank this material is added to a little hot water which soon brings the whole mass into solution. Sulphuric acid is now added to exactly balance the calcium and sulphate. Then the decolorizing carbon is added and the mixture stirred. Next it goes through the vacuum filter, the sludge being discarded while the acid goes to a storage tank (wooden), then to the stainless-steel evaporating pan for concentration to 50 to 60 per cent strength. (See Fig. 9).

Then the process is repeated, i.e., balancing the calcium and sulphate, addition of decolorizing carbon, except that heavy metals are precipitated by a suitable reagent and the batch is filtered again in the vacuum filter. After washing the cake, the acid comes out about 18 deg. Beaume, ready for diluting in a glass-lined tank, to the 50 per cent or 44 per cent strength required by the trade, followed by subsequent barreling as edible-grade lactic acid. This acid is as clear as water, but there is a market for a still purer grade in the chemical manufacturing industry.

Water White Lactic Acid

The chemical industry demands a very high degree of purity of lactic acid for the manufacture of synthetic plastics. In fact, the purest that can be made is none too pure for them. Hence the starting point for this grade of acid is U.S.P. grade of calcium lactate as it comes from the washing operation in the Hepworth centrifugal.

Steps in the purification are repetitions of those used in the preparation of edible-grade lactic acid, except:

1. Coming from the vacuum pan, the acid is 18 deg. Beaume, corresponding to 65 per cent lactic acid, whereas in the less refined acid the same density would correspond to somewhat lower acidities because of the presence of impurities.

2. All traces of calcium must be removed by addition of an excess of sulphuric acid. The test here is that the filtered acid shall give no precipitate with ammonium oxilate.

3. The foregoing steps in purification leave the problem of getting rid of the excess of sulphuric acid from the lactic acid. This is done by adding barium hydroxide and then adjusting the liquid to an extremely slight excess of sulphuric acid, an operation taking place between the two filtering operations.

4. Unless the final dilution is made with distilled water, it must be made with city water which contains calcium. Hence the dilution is made between filtrations instead of just after the final filtration. In this way the minute excess of sulphuric acid is balanced by the calcium in the city water and the precipitates removed.

Like the other grades of lactic acid, the water-white grade is packaged in wooden barrels. (See Fig. 10).

Yield Figures

According to theory, 1 lb. of lactose should produce 1.17 lb. of lactic acid of 50 per cent concentration of either water-white or edible grades. This would be equivalent to 9.1 per cent of the weight of the whey that was started with.

When commercial-grade acid is produced, the yield is very close to theory. The small loss seems to be due to anhydride formation, but not enough research has been done to explain or correct it.

On water-white acid the yield runs about 5 per cent of 50 per cent acid and, on edible-grades, the yield is slightly higher.

Whey-powder Manufacture

If there were no lactic-acid-producing equipment available, the surplus skim milk could be dried by either the spray-drying process or the roller-drying process. Although this produces low-value products from the skimmed milk, it would be

better than dumping the surplus.

Or, casein can be made from the skim milk by a method that will not be described at this time. A by-product from casein is the whey which can be made into a stock-feed ingredient by the process of evaporating it and drying into whey powder. However, so much surplus milk is available in the country that whey powder is not a very attractive outlet at the time of writing. Hence, all of the whey possible is converted into lactic acid, the limiting factor being the amount of available equipment.

As carried out at Sheffield By-Products Co., the whey in lots of 15,000 to 20,000 gal. is passed through a tubular preheater which carries the temperature to 190 to 200 deg. F. before passing it into a double-effect Buffalovak evaporator, in which it is concentrated to 20 to 40 deg. Beaume. The purpose of the preheater is to eliminate most of the tedious job of cleaning the tubes of the evaporator of materials which adhere during evaporation. Prior to the use of preheaters, the big evaporator had to be scrubbed out every two days. Then the preheater was installed on the theory that if whey is brought to a temperature higher than it ever attains in the evaporator, the solids which deposit will be found in the preheater, which is small and very easy to clean. And that is the way it has worked out.

From the double-effect evaporator, the concentrated whey goes first to a storage tank and then to a single-effect vacuum pan where it is further evaporated under a 25-in. vacuum to 60 deg. Beaume. At the same time, about 8 lb. of lime to every 100 40-qt. cans (1,000 gal.) of whey is added to almost neutralize any acidity that is present. This results in a product that runs about 1 per cent acidity after drying.

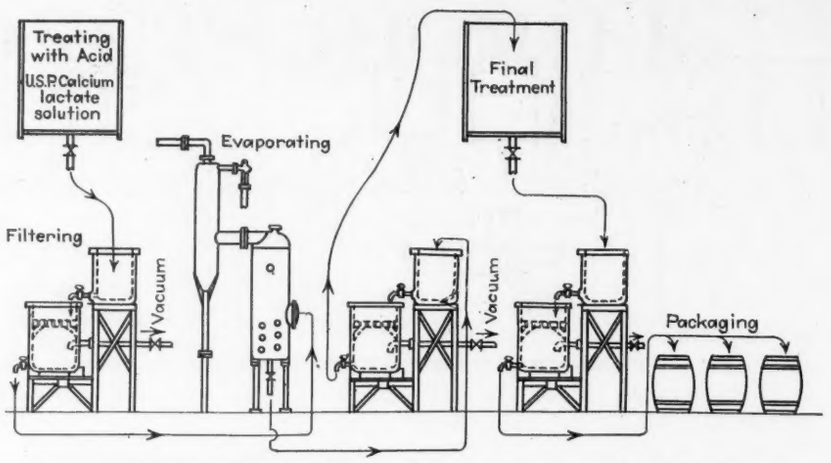


Fig. 10. Flow diagram for production of water white grade of lactic acid.

The concentrated liquid from the vacuum pan is very thick. It is allowed to run into a spiral-screw mixing trough in which it is mixed with previously dried casein whey. This acts as a sort of drying agent and converts the fluid into a plastic material. Then it is poured onto a concrete floor surrounded by a wooden curb where it "sets" in about fifteen minutes. It can now be broken up as a granular material which is then spread on trays, passed through a tray drying tunnel and is next ground to a powder.

Uses of Lactic Acid

Edible grade of lactic acid is used in the ice cream trade for giving a desirable tartness to sherberts. One large ice cream company in the National Dairy Products Corp. uses as much as 50 gal. of the acid each day during the summer months.

The pickled green olive business is beginning to use it to adjust the acidity of olive brines to correct figures, a procedure that avoids losses due to growth of bacteria which may occur when the brines are too low in acidity.

The water-white grade of lactic acid is in good demand by certain companies in the plastics industry. The higher the purity the better it is liked.

Other applications of lactic acid involve: used instead of tartar bath in dyeing; mordant in printing woolen goods; solvent for water-soluble dyes; reducer of chromic oxide in mordanting wool; used in cheese manufacture; in confectionery; for acidulating worts in brewing; for prevention of growths of *Cl. butyricum* in yeast manufacture; as a flux for soft solder; and as a food preservative.

When converted into its salts, the lactic acid also finds a number of important uses, such as U.S.P. calcium lactate in the manufacture of pharmaceuticals, likewise iron lactate. Copper lactate has suddenly become a fairly important material due to the discovery of a new method of electroplating which will produce almost any desired color. Copper lactate is a very important material in this process, which is controlled by the United Chromium Corp.

Chemical manufacturers are also considerable users of lactic acid of the better grade. Commercial lactic acid, however, goes largely to certain branches of the leather-tanning industry as a dehairer and decalcifier of hides.

In general, it may be said that lactic acid is barely entering its field of usefulness, and it appears likely that the non-food uses for this acid will grow to be its most important market.

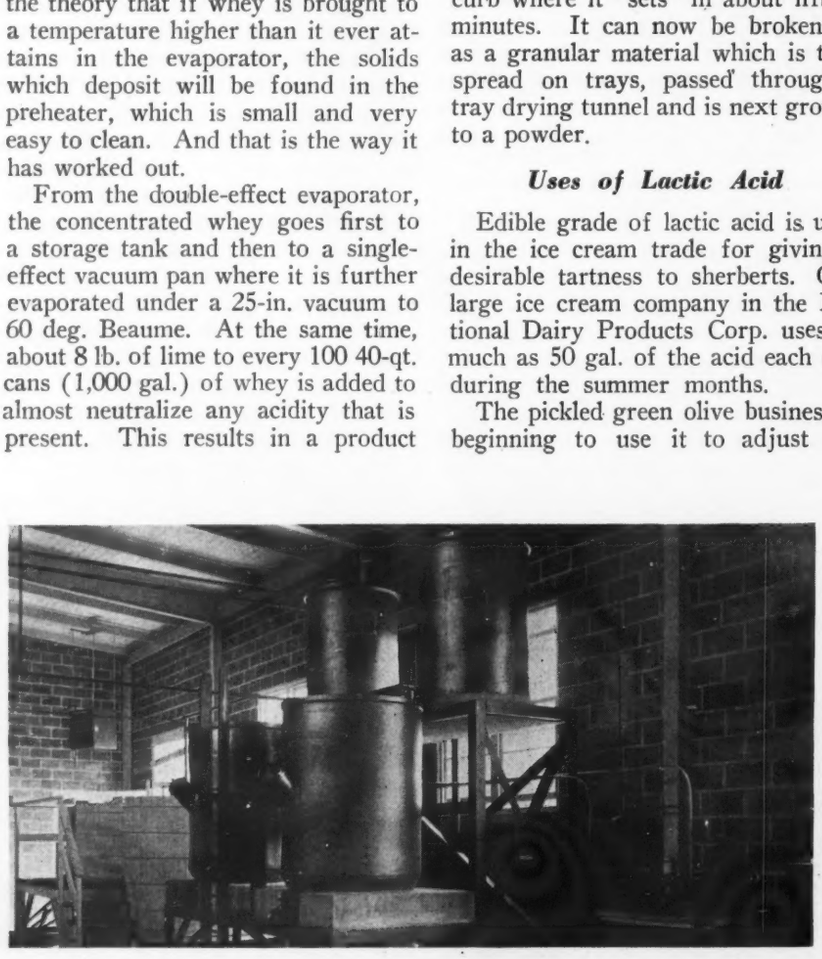


Fig. 12. Vacuum filters made of stoneware for filtering the lactic acid.

The FOOD TECHNOLOGY *Conference*

THE FIRST CONFERENCE on Food Technology held at Massachusetts Institute of Technology, Cambridge, Mass., has come and gone. Though the most optimistic forecasts of attendance gave 150 as the outside figure, with 80 to 100 as the more probable, a grand total of more than 550 were actually registered. Which shows how widespread is the interest in the interchange of ideas between the several groups that go to make up the food industries.

For the first time many a man heard leading food technologists in other specialized lines discuss problems and achievements, to discover that the other fellow, who was talking about different products than his, was describing things very interesting and useful to him.

Massachusetts Institute of Technology, where the food technology conference was held.

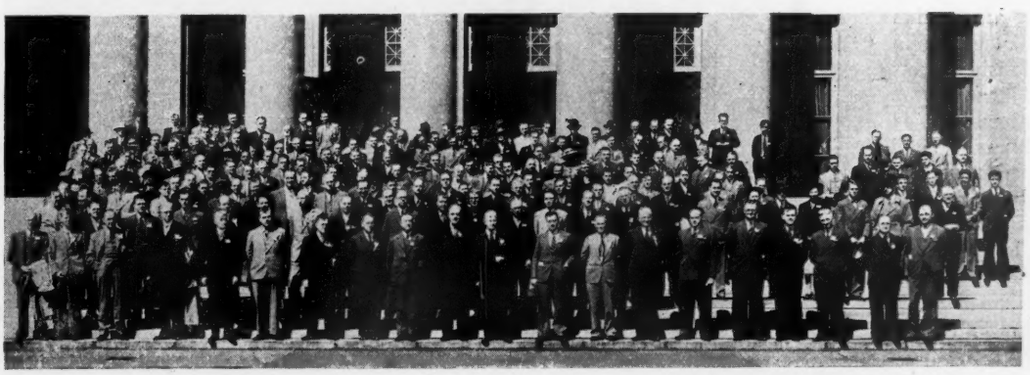
It was most gratifying to overhear a brewer compliment a dairy technologist on his paper, adding, "I thought we brewers had the lowdown on oxidation-reduction potentials, but evidently you dairymen know more about it than we do. May I come over to your plant next week and go into it further?"

And again to learn that an executive from a meat packing house said to a brewer that he wanted to learn more about the details of design of a vaulted ceiling which he had mentioned. This ceiling was drip-proof and would solve a contamination problem caused by ceiling drip that long had bothered meat packers.

Examples of the valuable interchange of ideas such as the foregoing is the very foundation of the editorial policy of FOOD INDUSTRIES. To those who eternally complain that "my business is different," it should be apparent that 550 men and women from a wide variety of food industries did not gather from 32 states and 5 foreign countries and stay four days to hear their own businesses discussed. They wanted to hear someone explain the other fellow's business.

But satisfactory and valuable though the first conference was, it is not enough. It ought to be an annual gathering. And its scope must ultimately be broadened if the food industry is to gain the greatest good. As a starter it was splendid. In the years to come it should include more engineering discussions. Out of some 40 papers in 1937, only three dealt with the engineering problems of food technology. Next year there should be at least ten such papers, for the engineering aspects of food production are still virgin territory. And any further conferences should present symposiums on common subjects of broad interest so that men from different branches of the industry could learn how the others handle the same identical problem.

Part of the papers which were read at the conference appear in condensed form in the pages that follow. Several more will appear in condensed form in December FOOD INDUSTRIES.—THE EDITORS.



Part of the 550 prominent food technologists who attended the conference at M.I.T., group on the steps of the Institute's main building.

Ozone in Food Storage

Present Use and Future Prospects

By ARTHUR W. EWELL,
Worcester Polytechnic Institute, Worcester, Mass.

Above 50 deg. F. (10 deg. C.), ozone does not appreciably inhibit the growth of bacteria upon food surfaces containing a large water content, unless such high concentrations are employed that the accompanying deleterious effect of the strong oxidizing agent vitiates its advantages. It is, however, of value in sterilizing the air[1] and in destroying (not simply masking) odors from both good and spoiled food.[2]

The primary purpose of low temperatures in food storage is retardation of physiological changes and growth of parasitic micro-organisms. Protection from serious loss of color and injury to surface taste requires high humidity and, with increasing humidity, the growth of bacteria and mold multiplies greatly. Treatment with sterilizing agents, such as formaldehyde, is generally prohibited. Introduction of other gases, such as ethylene, ammonia, or acetaldehyde, either gives little advantage or presents marked disadvantages.

Carbon dioxide, however, at concentrations of 5 to 20 per cent, has a remarkable specific inhibiting effect upon bacterial and mold growth but it has the disadvantage of the difficulty of gas tightness and, because in practice it usually replaces oxygen to a far greater extent than nitrogen, men cannot work in the room. Most large cold storage rooms must be entered frequently for removal of stored goods or entry of fresh products, which usually precludes the use of carbon dioxide.

Air motion is generally of value in keeping down bacteria and mold. It is particularly useful in the case of certain vegetables, especially celery. In the case of meat, it actually increases bacterial growth if the humidity is above 85 per cent.[3] Also, air motion increases the loss by shrinkage and in the case of beef, very seriously affects the color, reducing the "bloom." A velocity of 1 meter per second at 44 deg. F. and 90 per cent humidity will impair the color to such an extent that the storage time is reduced to one half.

The agent most commonly employed against mold and bacteria is ozone—an allotropic form of oxygen having three atoms per molecule rather than the customary two. This extra atom is readily released and becomes one of the most powerful oxydizing agents known. Since the residue is common oxygen, there are no objectionable residual gases. The concentrations employed are very low—a few ten-thousandths of 1 per cent—and, therefore, gas-tightness of rooms is of no importance. In contrast to carbon dioxide where the concentration in a gas-tight room remains constant, ozone must be supplied continuously to compensate for its continuous decomposition. The cost of production, however, is negligible and the equipment cost is small compared to that of other cold storage apparatus.

Ozone spontaneously decomposes bimolecularly, particularly if water vapor is present,[4] but at so slow a rate that this cause of disappearance is negligible compared with the monomolecular loss in the presence of oxydizable matter. If k represents the velocity or absorption coefficient, t the time in minutes during which ozone has been introduced into an enclosure at the rate of m grams per cubic meter, c the concentration attained at this time, and C the final equilibrium concentration, we may apply to all cases the monomolecular reaction equations:

$$\frac{dc}{dt} = m - kc. \quad C = \frac{m}{k}, \quad c = C\ (1\text{-}e^{-kt})$$

For a good egg room, k has a value of about .02 and for a full meat room, k is about 0.1[5].

Objectionable Features

There are obvious objections to the use of an oxidizing agent. Foremost is the production of rancidity. At concentrations of 100 to 200 mg. per cubic meter, or 50 to 100 parts per million (generally abbreviated to p.p.m.), products such as bacon, sausage, lard, cream, butter, dried eggs, mushrooms, meat and bananas are injured. But at the concentrations required effectively to reduce bacteria and mold, at temperatures below 7 deg. C. (45 deg. F.), ozone produces noticeable increase in rancidity only in butter, lard and fat sausage. At the end of about a week in a continuous concentration of 3 p.p.m. the surface of butter will show distinct rancidity and also slight bleaching. With prolonged exposure to even these low continuous concentrations of ozone, a considerable depth of butter will be bleached and turned rancid. Fat sausage becomes rancid in a day or two. Oxidation of pipes and fittings in a cold storage room in which ozone is used even continuously at relatively high concentrations (3 p.p.m.) is inconsequential. If, however, the doors have rubber gaskets these may disintegrate to some extent in about six months time at the ozone concentrations commonly employed if the ozone is continuously present. This is not true of synthetic rubber.

When Intermittent Ozonization is Best

Fortunately, the effectiveness of ozone in destroying bacteria and mold is largely dependent upon the equilibrium concentration. This is attained usually, except in egg rooms, in less than twenty minutes. An equilibrium concentration of about 3 p.p.m. gives nearly the same germicidal effect whether applied continuously or for

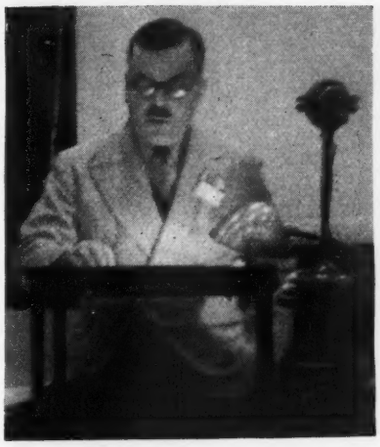
A. W. Ewell, (Ozone) of Worcester Polytechnic Institute, with briefcase and pipe.

two two-hour periods a day, or for one three-hour period. With ozone present for so short a portion of the day, if the storage is limited to a few weeks, rancidity only appears in the case of fat sausage, and rubber door gaskets last over a year. If butter and lard are to be carried many weeks they should be kept in covered containers.

Long exposure to ozone at the proper concentrations for meat rooms, and to a less extent at the concentrations in egg rooms, produces irritation of the mucous membrane of the throat and headache. It is, therefore, customary to introduce ozone into meat rooms only at those hours of the day when men are not working in them for any length of time, and to turn off the otherwise continuous supply of ozone to egg rooms during filling and removal of eggs.

Exhaustive studies of the growth of bacteria[6] and mold[7] on meat during storage and the changes in color (using the Block photometer)[8] have been carried out at the Refrigeration Technical Laboratory at Karlsruhe under the direction of Professor Plank. With a few exceptions, the specimens studied were taken from a freshly killed carcass and handled with extreme care, with the result that the initial infection was low and quite constant. The writer has conducted similar tests with many hundred meat specimens, procured from commercial meat houses and markets. The results of the two investigations are not always in agreement, particularly because of differences in the initial infection. The storage time to the appearance of slime is generally much less with market samples than with the carefully protected Karlsruhe specimens. The time, however, for serious color loss and for visible appearance of mold was often somewhat greater. The writer studied the color changes by comparison with 25 standard colors covering the range from brilliant "bloom" to almost black.

Both bacteria and mold absorb moisture in their growth. The faster growing of the two consumes so much of the available water that the growth of the other is checked. Dropping the temperature reduces bacterial growth far more than it does mold development. Below about 3 deg. C. (37.4 deg. F.) mold grows much the faster of the two unless the bacteria have obtained an advantage by high initial infection. The latter is generally the case with small cuts of meat, owing to extensive handling and exposure to infection, and it is also often the case with large pieces of meat in Europe.[9] In America the initial infection of large cuts is generally so moderate that spoilage is due to mold rather than to bacteria.



R. Plank of the Kältetechnisches Institute, Technische Hochschule, Karlsruhe, Germany.

Above about 3 deg. C. with all beef — and at lower temperatures when badly infected — surface spoilage is due to bacteria rather than to mold.

The most careful and comprehensive study of the effect of ozone upon bacteria on the surface of beef is that of Dr. Kaess at Karlsruhe.[10] The meat specimens used had initial infections between 100 and 1,000,000 bacteria per sq. cm. His results are in substantial agreement as far as they cover specimens comparable with those of the British Food Investigation Board and with my own along more practical lines. Perhaps the most interesting discovery of Dr. Kaess was that the bacteria upon beef become acclimated to ozone and, after a few days, the presence of ozone increases the rapidity of growth. He, therefore, advises (for a temperature of 3 deg. C. and 90 per cent humidity) the application of ozone for only three or four days. Inasmuch as the meat in a warehouse or refrigerator is constantly changing, such a procedure would be impracticable. At this temperature and this humidity, meat with low initial infection (not over 1,000 bacteria per sq. cm.) without ozone, will carry six days without bacterial spoilage, but serious color loss occurs in five days and mold usually appears in about four days. If the meat is badly infected with bacteria when placed in the refrigerator, bacterial spoilage may occur in two or three days. A concentration of 3 to 5 p.p.m. for a three-hour period each day will not appreciably hasten color loss and will inhibit mold and bacteria until, at about five days, loss of color has seriously impaired the appearance of the beef.

More Effective on Molds Than on Bacteria

A heavy growth of mold, or "whiskers," appears in the course of a few weeks upon beef which is free from high initial bacterial infection, at temperatures between 1 deg. C. and 3 deg. C. and a humidity of 90 per cent or greater. Ozone is much more effective in checking mold than bacteria, and with "clean" beef, at these temperatures, it will invariably increase the length of time before the visible appearance of mold several hundred per cent—i.e., from about two weeks to about eight weeks. The best procedure is a two-hour ozonization twice a day: once in the afternoon or when the workers have left, and again in the early morning before the cutters and porters arrive. The equilibrium concentration should be between 2.5 and 3 p.p.m.[11] If mold appears because of contamination from the outside or interruption in the supply of ozone, the next succeeding ozonization (2 or 3 p.p.m.) will remove a day's growth.[11] It is interesting to note that even though there is no visible mold to compete with the bacteria for the available moisture, the ozone keeps down the bacterial content, if initially low, to a salable limit. The natural color of cut surfaces of large pieces of beef, free from serious initial infection, lasts much longer than with small specimens under similar conditions. This is undoubtedly because of the greater amount of moisture available from the interior. The writer has investigated very carefully and extensively the growth of mold upon beef in rooms supplied with ozone but has never detected any evidence of acclimatization such as Kaess

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found with bacteria, and such as was indicated in some experiments of Heiling and Scupin with fruit mold.[12]

Ozone is relatively unimportant in freezer storage since bacteria and mold growth are small compared with growth at cooler-temperatures, i.e., above freezing. It is often of great value in sweetening up freezer rooms which have acquired a poor odor.

Ozone Protects Small Fruits

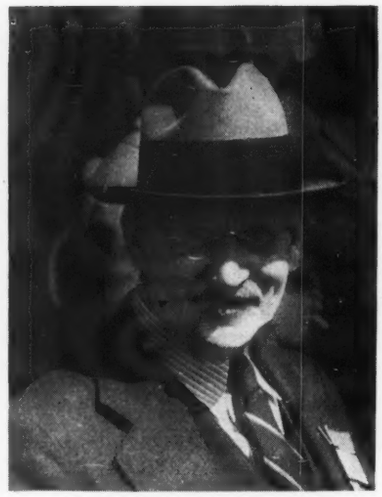
Small fresh fruits, such as strawberries, raspberries, currants and grapes (particularly sweet wine grapes), are very subject to mold. Their storage period may be doubled by 2 or 3 p.p.m. of ozone applied continuously or for several hours each day, provided they are not so closely packed as to hinder access of ozone. Apples carry at a proper temperature and high humidity very satisfactorily without ozone but the length of storage, especially of the more delicate and valuable varieties, may be prolonged many weeks by a similar use of ozone. Both English[16] and my own investigations show that such concentrations have no injurious effect upon apples. The use of ozone in apple storage destroys the unpleasant "dead" odor often noticeable but it also produces an inoffensive cloud throughout the entire room due to oxidation of the vapors given off by the apples.

It seems definitely established that aromatic fruits such as strawberries acquire a slightly richer characteristic odor and aroma when ozone is present.[13]

Several reliable investigators in this country and in Germany have reported that both butter and cream acquire an improved flavor after a few days in an ozonized atmosphere. The storage of fresh fish is moderately improved by ozone. The carry of many vegetables including asparagus, beets, cabbage, carrots, cauliflower, cucumbers, Kohlrabi, lettuce, radishes and tomatoes, is lengthened by 2-3 p.p.m. of ozone.[13 14]

Egg Quality Maintained by Ozone

Ozone has achieved its greatest success in egg rooms. To reduce shrinkage, i.e., to reduce the size of the void inevitable in every egg and the contamination accompanying the storage air which enters as the water vapor leaves, a high humidity is necessary. The growth of mold naturally increases rapidly with increase in water vapor in the storage room. A minimum continuous concentration of 0.6 p.p.m. of ozone is necessary to prevent mold growth if the eggs are relatively "clean." For "dirty" eggs, and to remove mold already present, a concentration of 1.5 p.p.m. is desirable. In a storage room filled with clean eggs with suitable aisles and overhead ducts, a concentration of 1.5 p.p.m. in the aisles will assure that the concentration will not decrease below 0.6 p.p.m. in the center of the piles. (Because of the lower concentration in egg rooms and the low value of the absorption coefficient with the consequently long time required to attain the equilibrium concentration, continuous introduction of ozone is preferable to introduction for a few hours each day.) Under such conditions, eggs stored at 31 deg. F. and a humidity of around 90 per cent, after eight months' storage, will be indistinguishable, when eaten raw or cooked, from eggs a few days old.[15] My own observations, as well as those of the English,[16] have shown that a continuous ozone concentration of as high as 3.5 p.p.m. for months will not injure eggs.



S. C. Prescott, (Dean) of M.I.T.

Lack of Quantitative Studies

The use of ozone has been very seriously handicapped by lack of scientific quantitative methods both in research and in practice. Many papers on the use of ozone have appeared in technical journals. Except in papers originating at the Karlsruhe Laboratories of Professor Plank, the Food Investigation Board in England, and of one investigator in this country—*the actual concentrations of ozone employed have rarely been given!* Without such knowledge, the results are hardly of qualitative value. If the results showed little or no value of ozone, they decided nothing about the effect at higher concentrations. If the experiments demonstrated the value of ozone they cannot be applied in practice without definite knowledge of the approximate amount of ozone employed.

A quantitative chemical determination of the ozone content of a known volume of air in a storage room requires apparatus, skill and time not usually available. There are, however, special potassium iodide-starch test papers with standard colors for comparison. A test paper is hung where information concerning the concentration of ozone is desired, and the minutes after moistening are counted until the color of the paper matches one of the three standard colors. From a table of times-colors the concentration is determined within an accuracy of about 10 per cent.

Ozonation Design Important

The designs of ozonators with a very few exceptions reveal an almost complete ignorance of the principles of the production of ozone by the ionization of oxygen despite careful formulation in the papers of Warburg,[17] von Wartenberg,[18] myself[19] and others. After testing or working with every commercial make of ozonator with an appreciable sale, I am compelled to state that there are only two manufacturers who produce entirely satisfactory machines and of these, only the larger models. One other company puts out a reasonably efficient and satisfactory product. The remaining score or more of ozonators for sale in Europe, England and America are inefficient in production of ozone, very unreliable in operation, and require frequent repairs or overhauls. The poorest ozonators are the ones most widely advertised, and with the crudest exaggerations of the value of ozone.

The introduction and distribution of ozone in cold storage rooms is often very inefficient. Most serious is the failure of all but a few of the leading cold storage plants to determine periodically the actual concentration of ozone in the different portions of each room. Quantitative determination is often limited to the sense of smell which in my own case, even with considerable experience, has been found subject to errors of many fold. With the poor quality of most ozonators, ignorance of the actual concentration of ozone obtained, and often, with poor distribution, is it not natural that many cold storage plants still use very little ozone while some others which do employ it are sceptical as to its value?

At the present time, the majority of large egg storage rooms throughout the world are provided with ozone-supplying equipment. In this coun-

try, a minority have satisfactory ozonators, proper distribution ducts or fans and by quantitative tests assure the necessary ozone concentration. The proportion of those in England and the Continent which maintain a proper ozone concentration is much less. Within the past year there has been a great improvement in Australia and in other parts of the Southern Hemisphere. Most large meat rooms on the Continent use ozone. Often adequate concentrations (a few p.p.m.) are maintained in the initial cooling room during the first few days after slaughtering but rarely is a proper amount supplied the storage rooms. A few meat rooms in this country employ ozone, and some use it in fruit and vegetable rooms.

It has been my experience that cold storage plants equipped with reliable ozonators, provided with means for proper distribution of the ozonized air plus personnel who maintain proper concentrations of ozone, have achieved the foregoing advantages from the use of ozone with eggs, meat, vegetables and fruit, and are enthusiastic about its use.

The experience of the great egg warehouses that use ozone properly is gradually compelling imitation by their competitors. The enhancement of value of meat, particularly beef, by ripening, aging or tendering is now generally appreciated in England and is slowly being adopted in this country. The customary method of ripening in use at the present time is prolonged storage at a few degrees above freezing. By the time the meat has ripened it is covered with an inch or more of mold or "whiskers." The meat is tainted in taste and odor to a depth roughly equal to the length of "whiskers" and this must be trimmed off and thrown away. Most chefs still determine the degree of aging by the length of whiskers, but a small number have learned that aging is independent of mold growth and that the serious trimming loss may be saved by elimination of mold by ozone. As the meat trade becomes aware of this saving, the use of ozone will increase. An efficient, reliable small ozonator for small meat rooms is unavailable at the present time.

Foreign investigations are often inaccessible to or unappreciated by practical American cold storage operators. A research laboratory in this country, similar to that in Karlsruhe, Germany, and those of the English Food Investigation Board—studying the use of agents such as ozone under practical American conditions—could keep in touch with our storage plants and secure their confidence. As far as ozone is concerned, I feel confident that the results of such research would increase its use and improve the necessary equipment.

Freezing and Cold Storage of Herring

By GEORGE A. REAY
Torry Research Station, Aberdeen, Scotland

THE SUPPLY of the British herring is markedly seasonal, as regards both quantity and quality. In both these respects there is, so to speak, a feast for one half of the year and a famine for the other. From May till November, herrings are caught in enormous numbers, shoaling close round the shores of Britain. From November till May, on the other hand, comparatively few herrings are caught. The quality, too, is better, in summer and autumn (May to November) than in winter and spring.

The problem of the storage of the British herring is, therefore, to preserve fish of good quality, caught in the summer and autumn, for consumption during the winter and spring, i.e., preservation for some six months. For centuries past this problem has been solved by curing herrings with salt, but new methods are called for in the face of diminished demand for this product. Thus, the practice of canning herrings in various ways has grown greatly in recent years. On the other hand, freezing and cold storage is little used.

A small quantity of herring is annually frozen in air and stored at temperatures around -10 deg. C., and a considerably larger quantity is kippered, frozen in boxes in air at the temperature just mentioned, and stored for periods up to four months. In both cases the product is inferior to the fresh fish as a result of various changes during freezing and storage. However, recent research at the Torry Research Station, Aberdeen, Scotland, has shown that, under the right conditions, freezing and cold storage involves less alteration than any other method of preservation, and that fish may be kept for several months in a condition almost indistinguishable from that of fresh fish.

Rapid Freezing Necessary

The general principles of the successful freezing and cold storage of fish were worked out at the Torry Research Station in the first place for white fish, such as haddock and cod. Storage at about -10 deg. C., the customary commercial temperature, inhibits bacterial spoilage, but does not inhibit various forms of alteration (e.g., development of cold-storage odor and flavor, formation of "drip" and denaturation of proteins) which in a few weeks render the fish less palatable and less suitable for smoke curing than fresh fish. On the other hand, if the following procedure was adopted, the fish retained the flavor and texture of the fresh fish for periods up to six months, and was also entirely suitable for smoke curing:

1. Freeze the fish rapidly (e.g., in circulating sodium chloride brine at -20 deg. C.).
2. Glaze the frozen fish.
3. Store the glazed fish at a low temperature, e.g., -20 deg. to -30 deg. C.[1]

Comparing Meat and Fish

White fish, such as the haddock, however, have a low fat content (e.g., less than 1 per cent), while herrings of the sort that might most usefully be stored have a fat content anywhere between 5 and 25 per cent, the bulk of the fat lying just beneath the skin where access of oxygen is easy. In the case of meat of various kinds, the preservation of the fat is the limiting factor in successful cold storage, for it is more difficult to stop those processes generally included under the term "rancidification" than any other sort of change. In the case of fish, it has been found that fatty fish like the herring require to prevent rancidification special precautions and conditions that are not necessary in the case of white fish.

At the Torry Research Station, sum-

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mer herrings were frozen singly in air at -28 deg. C. and in sodium chloride brine at -20 deg. C., and stored, with and without a glaze, at temperatures ranging from -10 deg. to -28 deg. C. for periods up to six months. The extent of rancidification was judged: (1) by tasting the subcutaneous fat—more particularly in the lateral brown band after cooking; and (2) by estimation of the peroxide in and application of the Kreis test to the subcutaneous fat. There was no close quantitative agreement between the increase in rancid flavor and the increase in peroxide or Kreis value, but sufficient parallelism was always found to make it clear that the chemical tests may be used as a practical guide to cold-storage procedure.

Glazing Helps

The development of peroxide in summer herrings during six months' storage at -20 deg. and -28 deg. C. after being frozen in air or in brine, with or without glazing, has been plotted in a series of curves. These curves show clearly that: (1) even over such a low range of temperature as -20 deg to -28 deg. C., tthe lowering of temperature has a marked influence upon rancidification; (2) brine-frozen fish, whether glazed or not, become rancid more rapidly than air-frozen fish; and (3) glazing retards rancidification.

Salt Activates Enzymic Oxidation

These results suggested experiments with pure herring oil, when it was again shown that the lowering of temperature retards oxidation. Moreover, at temperatures between -20 deg. and -28 deg. C., the atmospheric oxidation of the oil was comparatively slow—slower than the results obtained with whole fish might lead one to expect. This is more clearly realized if it is noted that the oil already contained some peroxide at the commencement of the experiment. When, however, minced herring muscle was mixed with the pure oil, the rate of oxidation was greatly increased; while if the minced muscle had been previously heated for half an hour in boiling water, oxidation was only slightly stimulated. These results have been taken as evidence that the oxidation of herring oil is catalyzed by an oxidative enzyme present in the flesh of the fish. It was also found that the addition of small amounts of sodium chloride to a system containing enzyme and herring oil resulted in increased oxidation. Sodium chloride in certain concentrations, therefore, activates the enzymic oxidation.

These experiments throw light on the results of the tests on the storage of summer herring. The more rapid rancidification of the brine-frozen fish may be explained by the activating influence of sodium chloride derived from the freezing medium. Much of this is washed off during glazing, but what remains has a definitely noticeable influence. The effect of glazing is best considered by comparing glazed and unglazed fish frozen in air, the complication of added sodium chloride then being absent. It is often stated that glazing exercises its inhibiting influence by diminishing the access of atmospheric oxygen. Glazing, however, also prevents desiccation in the superficial layers of the fish, and in the light of the "enzyme" hypothesis, it is possible that the more rapid rancidification in an unglazed fish is, to some extent, an effect of desiccation.

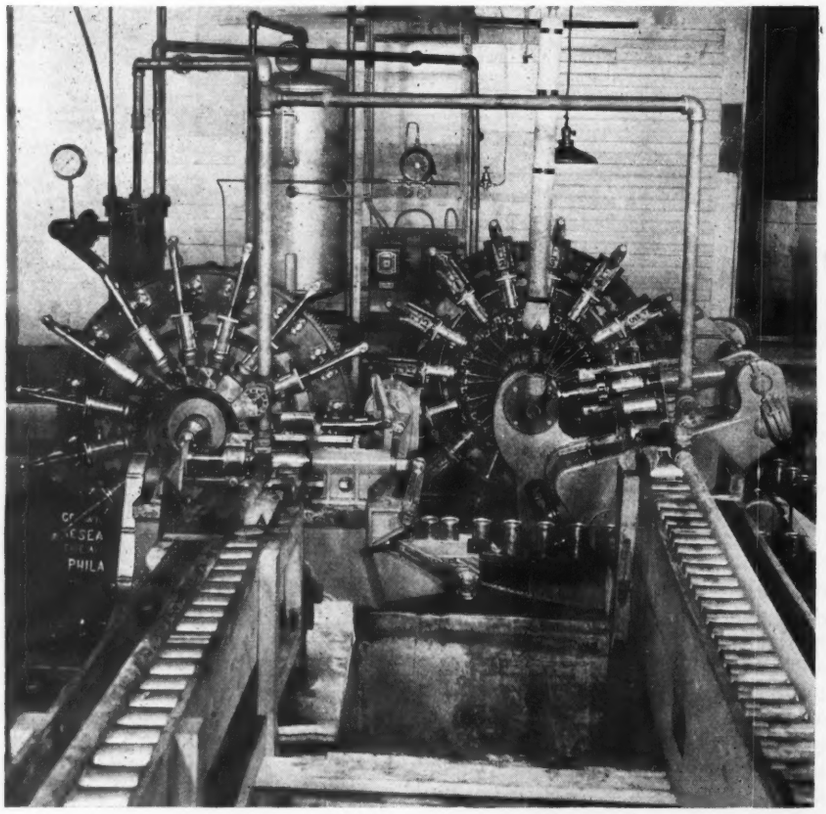
Freezing In Brine Cuts Two Months from Storage Life

To revert to the practical problem of storing summer and autumn herring over the winter and spring, experiment has shown that if the fish are frozen rapidly and free from contact with salt (whether by freezing in air or by some method of indirect contact with brine), and are then glazed and held at -28 deg. C., they can be successfully stored for six months. If the fish are frozen in brine, carefully washed and glazed, the storage-life at -28 deg. C. is only four months.*

Cold Storage for Kippers

In conclusion, brief mention should be made of another possible way of cold-storing herring over a period of months. In Britain, herrings are consumed to a great extent in the form of kippers, and as has been stated, herring rapidly frozen and stored at -28 deg. C. for six months can be made into good kippers. Recent experiments, however, have shown that storing boxes of kippers at -28 deg. C. yields a product, for periods up to six months, that compares favorably with freshly made kippers.

Storing the smoked fish might prove a more flexible method than freezing, storing and then smoking the fish. Experimental side-by-side tests of these alternatives are in progress.[3]



Two "Stero-Vac" machines with cooling troughs in foreground. After preheating and exhausting, cans of fruit juice go to one of the machines, where a vacuum is pulled on the container and then steam is injected to sterilize the product. A valve in the can top permits this treatment. Pressure inside the can closes this valve when the can is removed from the machine, and the valve is then permanently sealed in a clinching machine.

**These figures do not apply to lean winter fish in which rancidification is slower.*

Recent Developments in the Canning of Fruit Juices

By S. HENRY AYERS

Director of Research, Crown Can Co., Philadelphia, Pa.

PRODUCTION of the highest quality in fruit juices is dependent upon certain factors, those factors being as follows:

1. The quality of the fruit from which the juice is extracted.
2. The extraction methods.
3. The removal of oxygen.
4. The interior finish of the can.
5. The process of commercially sterilizing the juice.

For the best juice, the fruit must be fresh, tree-ripened and free from defects such as frozen or decayed pieces. In the case of the citrus fruit juices, which this discussion covers, no "drops" should be used, and the juice should be blended to secure uniformity.

Methods of Extraction

Extraction methods are very important, and for citrus juices the mechanical method used by Sun-Dine Co. will be described briefly. There are three steps in the process:

1. Grating the fruit to remove oil.
2. Pressing the whole fruit to remove the juice.
3. Straining the juice to remove seeds and pulp.

The grater consists of two horizontal revolving disks covered with stainless-steel fillet. Suspended above each disk is a spiral consisting of stainless-steel fillet supported so as to be rigid. The horizontal disks revolve while the spiral is stationary.

In operation, the fruit rolls into the center of the first disk and is thrown by centrifugal action of the revolving disk against the fillet of the stationary spiral and is turned over and rolled from the center of the first revolving disk to the outside. As the fruit travels through, the surface is punctured and grated by the projections around the perforations of the fillet, and the oil is released.

From the first disk, the grapefruit or oranges are transferred to the outside of a second revolving disk where the grating action is continued during passage to the center of the disk. At the center, the fruit drops through a hollow vertical bearing and rolls to a continuous press, where it is crushed and the juice extracted by pressure.

A fine spray of water is applied to the fruit during grating to wash off the grated peel and oil. After extraction, the juice flows to a mechanical strainer which removes the seed and excessive pulp. The total capacity of this mechanical extraction system has not been determined, but 1,500 oranges per minute have been run through.

High-Vacuum Deaeration Important

The removal of oxygen is very important and is accomplished in the Sun-Dine plants by boiling the juice under high vacuum and consequently at a low temperature, with a continuous flow of the juice.

Proper Containers

Plain tin cans are used for grapefruit juice, and a special type of lacquer is used on the inside of cans for orange juice. This juice is quickly changed in flavor by exposure to tin, as are some other types of fruit juices.

Rapid Heating

Quick heating of fruit juices is extremely important. This is accomplished in the Sun-Dine plants by a unique method known as the Stero-Vac process. This process is distinctly different from the flash-pasteurizing systems, in that the juice is flash-heated in the final container in the practical absence of air. This is accomplished by heating in the can by steam injection through a patented valve in the end of the can. This valve is formed in the can end and contains a floating disk which is forced, after the Stero-Vac treatment, against a special sealing compound and is then crimped into permanent position and tightly locked.

In the commercial lines, these valves ends are double-seamed onto the filled cans in the regular manner. At this point, therefore, the can of juice is completely sealed except at the valve.

Preheating

As it leaves the deaerating unit, the juice is at a temperature of 100 deg. F., and slightly lower in the filled can. After filling and seaming the valve ends on the cans, they are then run through a short exhaust box, where the temperature is raised to about 110 deg. F.

From this heating bath, the cans go to the Stero-Vac machine, which consists of a turret carrying headers with which the cans are held in contact. Vacuum and steam are applied through these headers, and the turret revolves in a vertical plane so that the cans are turned upside down. The vacuum and steam are applied through the valves in the ends of the cans.

The filled cans, with the valves open, are then fed automatically onto the Stero-Vac machine at the bottom of the turret so that the valve is in contact with the header.

During the first part of the Stero-Vac cycle, the cans receive a high vacuum as the turret revolves. The object of preheating the juice to about 110 deg. F. is so that it will practically flash-boil the high vacuum which the filled cans receive on the Stero-Vac machine. This removes the oxygen from the head space in the can prior to steam injection. The vacuum is applied when the can is in an upright position and continues until the can is tilted and the liquid content almost reaches the valve. At this point, the vacuum is cut off and steam is injected directly into the can through the valve. As the liquid is now in contact with the valve, it is violently agitated by the flow of steam into the can and is rapidly heated. The can continues with its steam treatment until it has been turned upside down and carried for about three-quarters of a complete revolution of the turret, when it is automatically lifted off the header. As it is removed from the header, the disk in the valve is snapped into place against a special sealing compound by the pressure inside the container. Then the can is permanently sealed by immediate passage through a clinching unit in front of the machine. This consists of a series of jaws which grip the side of the valve and compress the tin below the valve disk, thus forcing it into a locked position against the sealing compound.

Sterilizing in Eight Seconds

When the Stero-Vac process is applied to fruit juices, the complete cycle on the machine is about ten seconds, with approximately eight seconds of steam treatment. During this period, the temperature of the juice in the can is raised from about 110 deg. F. to 210 deg. F., an increase of approximately 100 deg.

In commercial fruit-juice plants, the Stero-Vac machines operate at rates up to 85 cans per minute. This capacity can easily be increased by larger machines.

Since the heating in the process is accomplished by condensation of the steam injected into the can, there is quite an exact dilution of the contents

of the can. In the case of fruit juices, it is very important that this dilution be compensated in some manner. This is accomplished by running the juice through a continuous deaerating system, in which the juice is boiled under a high vacuum. In this process, the oxygen and most of the other gases are removed, and at the same time a certain amount of water is taken out. The water removal is equivalent to that added to the juice by the injection of pure steam in the Stero-Vac process. Because this deaeration and removal of a small amount of water is accomplished under a high vacuum and at a temperature of around 100 deg. F., and because of the speed of this treatment, there is no influence on the flavor of the product.

Features of Process

Some of the features of the process, as applied to fruit juices, are as follows:

Flash heating in the final container, in which the heating is so rapid that no flavor change is produced, even with the most delicately flavored products.

The method permits of flash heating to high temperatures sufficient to destroy all enzymes without producing flavor change. Complete inactivation of the enzymes is very important in canning fruit juices. The heating is accomplished in the practical absence of oxygen. The importance of this feature in relation to the prevention of any destruction of vitamin C and on its retention during storage of the product is evident.

Not only is vitamin C unaffected by the Stero-Vac process, but the degree of its retention during storage has been remarkable. The removal of oxygen from the product and can before heating also has a marked effect on reducing the corrosive action of the juice on tin plate.

The process has economic features. It is labor-saving, and the heat applied for processing is most efficiently used because it goes directly into the can through steam injection.

In the canning of fruit juices, it is essential that the juice be rapidly heated in such a manner as to produce commercial sterility without flavor change. It is also equally important that the juice be cooled as rapidly as possible.

Following the Stero-Vac flash-heating process in the can, the containers are run immediately into a cooling system, in which the cans are slowly rotated in a trough where they are submerged in water. Fresh water is supplied in a coarse spray the entire length of the trough.

Cooling Produces Vacuum

As the cans leave the Stero-Vac machine, the juice is at about 210 deg. F. and under about a 17-lb. pressure. At the end of the cooling line, the temperature is about 90-95 deg. F., and the cans show a vacuum of about 22 in. of mercury.

The cans are then conducted over a runway and rolled at high speed around sharp turns to throw off adhering water, and then run through the labeling machine into the final packing cases. The juice is not cooled below 90 deg. F. for the reason that this temperature will assist in the rapid drying of any moisture on the cans.

Rapid Handling Important to Quality

It is important that fruit juices be extracted and canned as rapidly as possible. Juice must not be allowed to stand exposed to air, and the entire process from extraction to the finally processed can should be continuous. In the Stero-Vac system, as practiced in the Sun-Dine plants, the entire process takes approximately five minutes, and is continuous.

Among other things, quick heating and quick cooling are necessary in the production of the best quality fruit juices, and great progress has been made along these lines during the last few years.

Applies to Other Foods

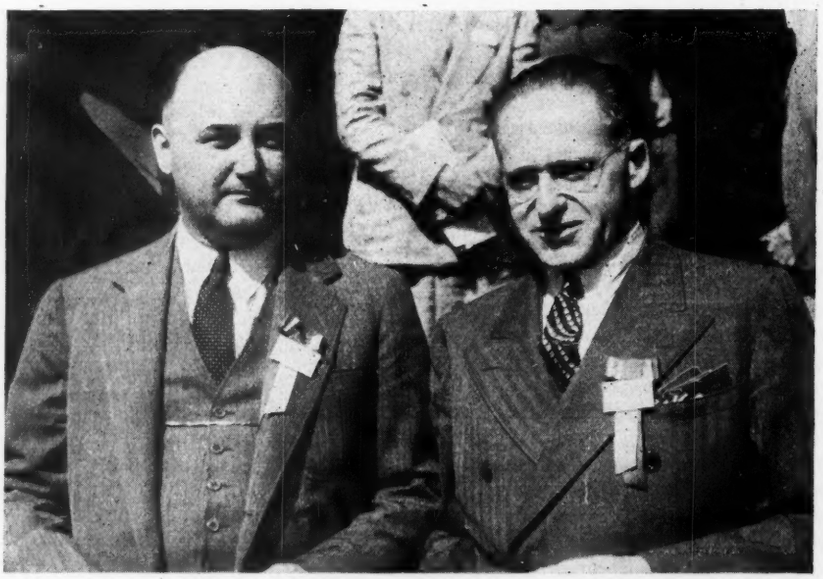
The system applied to citrus juices may be applied to all fruit juices, the extraction method being the only procedure which has to be varied. Tomato juice processed by this flash-heating system in the final container has a fresh, uncooked flavor entirely different from that of the usual canned tomato juice. One of the problems in packing pineapple juice is the change in color which takes place during storage and which is accompanied by loss of flavor. Pineapple juice processed by the Stero-Vac method has been held for five years, with no color change and no change in flavor as far as could be noted.

The Stero-Vac process is not confined solely to fruit juices. Many fruits have been processed by this system, with the result that the fruits retain more of their natural flavor and texture.

Under experimental conditions and by the use of temperatures above the usual ranges, evaporated milk, whole-grain corn, peas, string beans and lima beans have been rendered sterile from a commercial standpoint. Evaporated milk requires a cycle on the Stero-Vac machine of about fifteen seconds, and the vegetables mentioned, a cycle of twenty seconds. Naturally, the effect on the product of this short sterilizing period is noticeably different from the long periods of retort processing. Evaporated milk, for example, retains its original color and flavor, while the vegetables more nearly approach fresh products, particularly in flavor and texture.

It is believed that through quick heating and cooling processes, the canning industry has revolutionary possibilities ahead of it.

Maurice Piettre (Institut International du Froid) listens to Jim Tobey (Borden Co.) air his French.



E. J. Cameron (Bacteriologist), National Canners Association and C. O. Ball (Heat Penetration), American Can Co.

Modern Practice in Preservation of Fish by Cold

By LOUIS BERUBE

Technologist of Maritime Fisheries, Quebec, Canada

THE MORE CENTRALIZED AN INDUSTRY, the easier the penetration of science —the more decentralized, the harder. In the field of fisheries, this decentralization is pushed to the limit. The technological engineer is different from the man of research. His duties are, in general, not to find new improvements, though he often helps the man of research in his particular aim towards an improvement in technic. On the other hand, altogether, he has no time for research. When some new principle, some new process or some new method has been devised, he works on its application to the industry for the betterment of the products to be put on the market.

Cold has two definite fields in its application to the preservation of fish. The first one is chilling or refrigeration, fish being kept unfrozen until it reaches the consumer. The second one is freezing or congelation, where the fish is frozen hard and kept in that condition until it reaches the retailer, or even the consumer.

The present fresh-fish trade has grown up from the demand of the public for a fish as fresh as "just out of the water," and from the poor quality of the first frozen products of 20 or 25 years ago. In the early years of the trade, fish was simply preserved in ice and sent to nearby markets. The development of the trade has demanded shipments to more and more distant markets. However, fish is very perishable, and its internal constitution makes it an easier prey to deterioration than animals. Moreover, its slime, its gills, its stomach contents—even the shops in which it is prepared for the market—are easy fields for bacterial infection and subsequent spoilage. Thus, cold as applied to fresh fish can only retard bacterial infection. It cannot stop the work of bacteria, even less can it kill them.

To stop bacterial action, a corresponding means has been devised. Mild antiseptics, harmless to humans, have been found by research men and then applied in the industry. Some fisheries incorporate them in the ice (chlorine) used on fishing boats to preserve fish. Some use them as a solution in which round or dressed fishes are washed thoroughly before packing. Many chemicals could be used, but the law is very strict on this particular point and few are allowed. The ideal one is yet to be discovered but, as soon as it is, the industry will be eager to adopt it for it will facilitate the preservation of fresh fish.

F. W. Tanner, University of Illinois, left; Lewis W. Waters, General Foods Corporation, right.

It has previously been said that fish is highly perishable. As in the case of milk preservation, the application of cold for its preservation (a thorough chill) has to be done as soon as possible after fish is caught, and the faster the process of cold penetration, the longer the period of safe preservation. As liquid solutions extract heat about five times faster than still air, melting ice is one of the best refrigerants. Hence, packing the fish in a generous supply of crushed antiseptic ice is still one of the best methods of fresh-fish preservation. It is said that halibut can be kept three weeks through such a process. Care has to be taken, however, to keep a large supply of such ice. On account of its minute particles, crushed ice adheres more evenly to fish and so extracts heat more rapidly. Then with the help of the minute particles of air imprisoned within, it acts as an insulating material and keeps the fish in a safer condition than ordinary ice.

Brine Contact To Be Avoided

Fresh or chilled fish has its limitations, however, and the demand for a high-quality frozen fish has been created. The old still-air freezer is discarded (scientifically speaking). Heat can be taken out of the fish by three methods, convection, conduction and radiation. Radiation is no use. Air is the poorest conductor but the fastest convector of heat. A liquid solution is a good conductor and can extract heat five times as fast as still air. However, with the increased thickness of the fish the conduction decreases, and the advantages of the liquid solution as a medium for extraction of heat are somewhat minimized. Therefore, modern practice has adopted the liquid solution for packaged fish with either direct or indirect contact, and has kept circulating air or a cold blast for round fish and, in particular, for very large fish. The most frequently used liquid solution has been a combination of sodium or calcium chloride brine with other chemicals. Even sodium chloride brine has a deteriorating effect on the appearance of fish on account of a slight salt penetration. One scientist has found a liquid solution that uses no brine at all. As soon as his new discovery is made available we are going to adopt it.

Circulating air is slower than liquid solutions, and has a tendency to cause quite an unusual amount of desiccation on the outside of fish. This has been overcome by dipping fish in water before freezing, or better by leaving a small outside layer of fish to freeze in still air before starting the circulating fans. Both freezing systems are far advanced and on a solid footing, but there is yet room for improvement in many details, and research continues. When found, these improvements will be transferred into the industry.

Fish, frozen as soon as caught, is fresher when defrosted than ordinary fresh-chilled fish as found on distant markets, and the trend of the trade is towards an extension of the freezing industry.

Tests On Quick Freezing

Applied to Large Cuts of Meat

By MAURICE PIETTRE

Director, Institut International du Froid
Paris, France

Austin A. Scott, Nestle's Milk Products Co., in heavy debate.

WHILE QUICK FREEZING is now successfully applied to fruits, vegetables, and small pieces or packages of animal foods, it has yet to find successful commercial use with such large products as quarters of beef. Such a development is of considerable importance to meat packers, as it would permit them to improve the long distance shipping and long time storage of wholesale or bulk meats.

Experiments with the quick freezing of beef quarters were started many years ago in France under the auspices of the French Army and work of this nature was carried out there by Barrier from 1890 to 1906 at the Institut du Froid. He placed the beef quarters in the cans normally used for ice manufacture and froze the meat by brine circulation outside of the can, as is normal in ice making. This system required 12 hours to reduce the meat to a temperature of 28.4 deg. F. (—2 deg. C.)

In recent years these experiments have been renewed by Hoveman at Arras. He substituted a latex rubber composition bag for the can, and used a brine spray at temperatures from —14 to —22 deg. F. as a refrigerant. After the meat was placed in the bag, the air was exhausted from it by means of a vacuum pump. This caused the bag to collapse, so that it touched the meat at all points and permitted rapid penetration of the cold.

In operation, half sections of freshly killed beef are brought direct from the slaughter house to a chill room. Here the temperature of the meat is reduced by ordinary chilling methods and the half sections are then cut into fore and hind quarters. The quarters are then placed in the rubber bags and the air is exhausted from the bags.

The filled bags next pass into the brine shower room where they are sprayed with brine at a temperature held close to —22 deg. F. The meat passes through the 32 to 28.4 deg. F. temperature range in the first 5 hours. To bring the inner parts of the cut to a temperature of 3.2 deg. F., at which time the freezing is completed, requires a total of 15 or 16 hours.

The whole cycle does not require more than 24 hours. Therefore, the chilling and freezing rooms can be emptied each day in time for the next day's fresh kill.

Patents covering this operation and the use of the thin, elastic latex bag are held by Hoveman.

After freezing, the meat, still in the bags, is stored in low temperature cold storage. When it is desired to defrost the meat, the bags are put in a room of ordinary temperature. As the meat thaws, it is thus protected from condensation and from contamination through contact with the atmosphere.

After defrosting and removal of the bag, the meat has the color and appearance of freshly killed meat, and the texture and odor are normal. Tests have shown that only a negligible amount of rancidity develops in the fat. Consumer tests on cuts from such meat proved the flavor to be satisfactory, with no rancid taste.

In addition to beef quarters, the method has been used successfully for the quick freezing of whole sheep carcasses, fish and poultry. With smaller pieces the freezing is more rapid. An 84-lb. sheep carcass was frozen in 3½ hours.

This process appears to have definite advantages, including saving in time and in space requirements. The area required is but 60 per cent of that needed for slow freezing of meat. There is also a saving in refrigeration, in maintenance, and in shipping costs. Finally, it is also possible to use the system for quick chilling where freezing is not desired.

Recent Advances In Brewing Technology

By GEORGE B. SIPPEL

Vice-president and Brewmaster,
Burger Brewing Co., Cincinnati, Ohio

BREWING is a highly complex process employing almost every known phase of chemistry and physics. In addition, it demands of agriculture the furnishing of basic raw materials of definite specifications. American beers have specific properties which require the development of special varieties of six-rowed pedigreed barleys, as distinguished from the two-rowed pedigreed barleys of Europe. There are a few two-rowed types of barley in use in California. The Bureau of Plant Industry, U.S. Department of Agriculture, and the agronomy department of the University of Wisconsin are working intensively on this particular problem. The problem involves:

(a) Practical farming, in that the farmer is interested in:

1. Yield per acre;
2. Resistance to diseases;
3. Good stand;
4. Good threshing qualities.

(b) Practical malting. The maltster is interested in:

1. Yield as malt per bushel;
2. Character and thickness of husk;
3. Germinating capacity;
4. Uniformity of size;
5. Absence of foreign grain;
6. No varietal mixtures.

(c) Practical Brewing. The brewer is interested in:

1. Yield as beer per barrel;
2. Protein (quantity and quality);

3. Enzymatic strength;
4. Thickness and character of husk (filtration properties and flavor);
5. Flavor.

The farming program as regards barley is well in hand, and we have every reason to believe that new varieties of barley of great interest to the malting and brewing industry will soon be available.

Much Progress in Malting

Malting has become a specialized industry confined to a few large breweries and to commercial malting establishments. Tremendous strides have been made from the old floor-malting processes of 40 years ago in which the barley was steeped in any pure water, spread on wood or concrete floors, turned with wooden shovels during the germinating period to remove the respiration gases and to cool the barley, and then withered and dried over coke-oven kilns. Today the barleys are carefully selected as to variety and germinating power and are sorted as to size (it is obvious that, among other advantages of sorting, the moisture content of the barley during steeping can be controlled to better advantage). Then the barley is steeped in water of a known chemical composition, of a known pH, at a carefully controlled temperature (50 to 60 deg. F.), in steeping tanks of special design to assure absorption of moisture. These tanks are equipped with aerating devices to assure proper mixing and to raise small, light barleys and foreign grain to the top of the tank where they can be removed by skimming. The optimum moisture content for steeped malting barley has been established at about 45 per cent.

The germinating process, during which the barley malt acquires its enzyme activity and the starch and protein are modified, is now conducted in so-called pneumatic chambers under absolute air and moisture control, the product being continually turned over by moving helicoidal rakes. Or the process is conducted in slowly revolving drums containing air tubes to inject the proper amount of air and moisture. The withering and drying are done in thermostatically controlled kilns at temperatures to insure maximum flavor, proper enzyme content and the production of stable haze-free beers. Overmodified malts dried at low temperature are not desirable for brewing.

A recent innovation has been the malting of barley in vacuum driers. Malts prepared in vacuum drums possess an unusually high enzyme content, in some instances well over 200 deg. Litner, whereas the standard brewers' malt tests about 90 to 130 deg. Litner.

American hop culture, now confined to the states of California, Oregon, Washington and New York, is keeping pace with other advancements in the art of brewing. New roots are being imported from Europe and attempts made to acclimate them to American soil and weather conditions, the trend being toward the development of an American seedless hop. The hop plant is unisexual, either male or female. Pollination results in the formation of large cones containing up to 26 to 30 per cent seeds which are of no value in brewing. The elimination of male roots retards the growth of the flower, resulting in smaller cones of greater brewing value with a minimum seed content.

Hop plants must be dried before delivery to breweries. Hops dry out to about 25 per cent of their original weight. Considerable improvements have been made in the design of kilns to insure uniform drying and maximum brewing value and flavor. A balanced suction and pressure air system, in which the air is forced through a layer of hops by pressure and then removed from above the layer by suction fans, has proven very satisfactory.

Chemical Analysis Becomes Important

In former years, hops were judged as to brewing value solely by physical examination, appearance, color, aroma, freedom from leaves and stems. Today, the chemical analysis is assuming considerable importance. Studies on the transition of alpha resin or humulon to beta resin or lupulon are receiving increasing attention. Wollmer has recommended an evaluation factor to establish the brewing value of hops of alpha times beta resins divided by nine.

The antiseptic value of hops and their ability to inhibit bacterial growth has been known, but it is only recently that we have had definite proof of this interesting property. Walker, Hastings and Farrar (1932) established an antiseptic value of the alpha or the humulon resin at 400 times that of phenol, using a pure-culture bacillus as an indicator. Shimwell and others, however, have definitely established the fact that this antiseptic power applies only to gram-positive organisms. Gram-negative organisms are not affected.

Oxidation prevention is vitally important in preserving hops. Hops are harvested in August and September. They are used in brewing in the succeeding ten months. A rapid decline in flavor and bitter value will result if hops are not stored in dark, cold storage below 40 deg. F. Under these conditions they will keep for several years. Warm storage encourages oxidation into hard valueless bitter acids. Hops are compressed into standard bales of 200 lb. weight and 11 lb. per cu. ft. compression. Hops compressed to 25 lb. per cubic foot are not as readily oxidized. Higher compression, however, expresses hop oils which are oxidized by the air present in the bales, and we have a retrogression and formation of valerianic acid or so-called "cheesy hops."

One fundamental difference in the brewing of American type beers as against Continental beers is the use of so-called cereal adjuncts, corn and rice,

1, George Sippel (Production), Burger Brewing Co.; 2, W. H. Harrison (Research), Continental Can Co.; 3, A. A. Schaal (Technical Service), Lever Bros.; 4, F. C. Blanck (Food Research), U. S. Department of Agriculture; 5, A. K. Balls (Enzymes), U. S. Department of Agriculture; 6, D. K. Tressler (Food Preservation), New York State Agricultural Experiment Station.

in conjunction with barley malt. This is possible because of the surplus of diastate present in six-rowed barley malts, making possible the conversion of an excess of starch over and above that present in the malt itself.

Research on Enzymes

Studies on the behavior of selective enzymes, pH and rH are popular research problems of modern brewing technology. However, much could be accomplished if we had a better knowledge of starch products. *Zea mays* is still the one and only source of corn starch for breweries, but *Zea mays* green from the fields, *Zea mays* air-dried and *Zea mays* kiln-dried react quite differently as regards their susceptibility to the action of amyl enzymes.

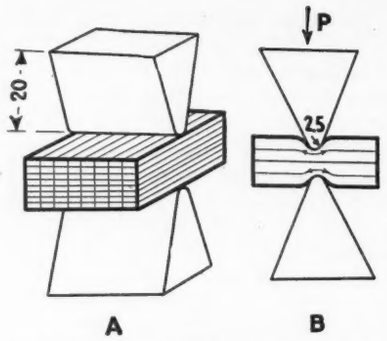
We have a similar problem in the use of rice. East Indian, Siam, California and Southern rices possess varietal characteristics not fully understood.

Sörenson's discovery that active acidity is of more importance than total acidity has aided materially in explaining and controlling the complex mashing process in brewing. It has helped to explain the different behavior of brews mashed with carbonate waters and those brewed with waters containing sulphates and chlorides. It has established the fact that brewing water should not be alkaline, a pH of 6.8 to 7.0 being preferable, and clears up the question as to the beneficial presence of calcium sulphate and sodium chloride in certain brewing waters.

Sherman and Thomas (1920, Studies of the Amylases) established the optimum pH for pure diastase at 4.2; however, it is interesting to note that in a heavily buffered substrate, as brewers' wort, the optimum pH for diastase is 5.1 to 5.3. We have two amylolitic enzymes to deal with, the amyloclastic or starch-splitting and the saccharogenic or sugar-forming. Brews which are mashed in at a pH below 5.0 result in poor conversion and starch turbidity. It is reasonable to assume that the saccharogenic enzyme may have an optimum pH of 4.2, but the amyloclastic requires a higher pH. Both enzymes work in perfect harmony at pH 5.2 to 5.4.

Proteolytic activity is not as sensitive to pH, higher yields of soluble proteins being obtained at a pH as low as 3.7. Adler places the optimum for proteolytic enzymes at pH 4.3 to 5.0. Lundin found a protease with an optimum activity of pH 3.7 to 4.3 and a pepidase with a maximum activity of pH 6.1 to 6.4 which liberates amino acids from polypeptides.

However, it must be borne in mind that it isn't quantity of protein we want but quality. It is common practice in



T. Moran's artificial biting mechanism to determine tenderness.

American breweries to employ a so-called "protein rest period," usually an hour, as the initial step in mashing. This results in there going into solution a complex mixture of protein substances, principally albumoses, peptones, polypeptides and amino acids. They provide nourishment for the yeast during fermentation, they influence the palatableness and flavor of the beer, they have a marked influence on the foam-retention properties of beer, and unfortunately, some of them are responsible for certain complications such as chill haze, filtration difficulties and precipitates.

The enzyme phosphatase responsible for the modification of organic phosphates into inorganic phosphates has an optimum pH of 5.2 to 5.3, according to Lüers and Silbereisen. The inorganic phosphates, together with the amino acids and organic acids present (lactic acid), help to establish the pH value of the mash. According to the investigation of Dufour (*Petit Journal in Brasseur,* 1925 to 1933), the buffer substances present in the substrate of the mash are extracted during the initial stages of the mashing.

The American public demands crystal-clear sparkling beers capable of maintaining their "brilliance" at extremely cold temperatures. Americans drink beer at a temperature of 40 deg. F. and less. Europeans drink beers at temperatures from 50 to 60 deg. F. The acknowledged world supremacy of American bottle beers can be attributed to the solution of the problem of prevention of chill hazes, precipitation of protein products and retrogression of flavor because of pasteurization.

Malt contains a complexity of high and low molecular proteins; some go into complete solution; some go into solution as borderline colloids; some precipitate as coarse or fine particles. The reaction of the tannins, released from the husk of barley malt and from hops, with these proteins plays a vital part in the production of chillproof beers. According to Hopkins, protein tannin is formed rapidly at high temperatures under violent movement and immensity of surface; whereas, low temperatures facilitate its separation from solution, and surface activity, its separation into coarse flakes. At a pH of 4.4 to 4.6 there always are present in beer positively charged proteins capable of combining with tannins, and consequently we always have the problem of haze formation.

Use of Selective Proteolytic Enzymes

The American brewing scientists, Max and Leo Wallerstein, conceived the idea of adding to beer immediately after the fermentation period, selective proteolytic enzymes which work upon these protein structures. This simple treatment delayed the formation of protein-tannin-haze substances and made possible the production of haze-free chillproof beers.

The study of the protein-tannin complex is today one of the most active problems in modern brewing research. Not only is the selection of the proper raw materials involved, but recent studies of Seligman, Clendennin, Bishop, Moritz and Watkins indicate that the rate of cooling of brewers wort between certain temperatures (140 to 70 deg. F.) has a direct bearing on preciptation of protein tannins. This rate varies with the raw materials, but it has been established that a difference in the rate of cooling will materially alter the rate of clarification. Clendennin suggested a yardstick of measurement of this phenomena, terming it "the critical break rate." The work is comparatively new, and although it has been demonstrated that quicker cooling rates produce brighter worts, their effect on flavor has not been established.

A creamy, compact head of foam, so desirable on a glass of beer, presents an interesting story. Foam has been described as gas bubbles dispersed in a liquid. Actually, however, foam always gathers on a liquid. But it is well to remember that foam will never form on a true liquid. Froth will form only on molecular or colloidal solutions. Surface tension plays a vital role in foam formation, as does the law of Gibbs and Thomson (in any solution, the substance with the lower surface tension is concentrated on the surface). Viscosity plays an important role.

According to Jakob Blom, "in considering foam on beer we must distinguish between head formation and head retention." Head retention in beer depends on three principal properties:

(a) The presence of easily coagulable surface-active colloidal substances;
(b) A low surface tension (44 to 50 dynes);
(c) High viscosity (dextrin).

Surface-active substances in beer are alcohol, volatile acids and esters, colloidially dissolved proteins and hop resins. These give beer the low surface tension (44 to 50 dynes) resulting in the formation of smaller diameter bubbles than would be formed under similar circumstances in water.

Lüers has calculated that 100 cc. of carbon dioxide liberated by pouring one liter of beer into a glass will form 3,000,000 foam bubbles with a diameter of 0.4 mm. and a surface of 1.5 sq. cm. This surface is 144 times greater than one single spherical bubble of 100 cc.

One great problem of the brewer is to educate the purveyor of beer to properly cleanse service glasses. Beer poured into greasy glasses or glasses which previously contained milk or remnants of fat or milady's lipstick will not retain a head of foam. Fats or soap have great surface activity and will expel the proteins from the surface. At the low pH of beer, the fats are hydrolized to free fatty acids, with the result that the foam collapses. Glasses should be cleaned with alkaline detergents—never with soap.

The significance of oxidation-reduction potential in brewing is receiving impetus through the excellent work of De Clerck, Mendlick, Hartong and Van Laer in Europe and through the work of Laufer in America.

Oxidation-reduction reactions take place in every phase of malting and brewing. From a practical standpoint, it is receiving wide attention in the elimination of air in the packaging of beer; whether in barrel, bottle or can.

Bottled or canned beers containing less than 2.5 cc. of air per 12-oz. package resist flavor changes and haze formation far more readily than beer with higher percentages of air. What we need are simple, reliable methods to measure this interesting phenomena.

How Byproducts are Utilized

Utilization of byproducts in the brewery centers around three products, the spent mash, surplus yeast and surplus CO_2 gas.

The spent mash, dried in revolving drums equipped with steam coils, is known as brewers' dried grains. It is an excellent dairy feed and has been an article of commerce for at least 30 years.

During the fermentation, the yeast crop multiplies to four times its original volume, thereby leaving a surplus. During the brewing process, the yeast absorbs considerable quantities of vitamin B_1 and B_2, and it contains a provitamin ergosterol capable of being irradiated by ultraviolet light into vitamin D. It, therefore, has found a ready pharmaceutical market. Yeast is rich in proteins and fat, and with proper drying should be suitable for a great many useful products.

Although most brewers employ open fermentation tanks so as to be able to observe and control the delicate fermentation cycle, all brewers possess a few closed fermenters collecting the CO_2 gas given off, to be used subsequently for pressure control or for carbonating purposes. A great quantity of CO_2 goes to waste.

Closed fermenting systems to make possible the utilization of surplus CO_2 gas were in successful operation 20 years ago and will soon again find adoption in modern breweries.

Brewery construction and equipment has kept pace with the advancement in brewery science. Modern breweries no longer are bound to the gravity-flow system.

Air conditioning is used extensively in storage cellars and in some fermenting cellars. But in the latter, extreme care must be taken to prevent excessive drafts or blasts of cold air on the fermenting beer, as this would result in sluggish fermentations and a multitude of other troubles.

Air-conditioned hop-storage rooms require low-velocity air (less than 75 ft. per minute), a relative humidity of about 75 per cent (Schmidt) and a temperature of 33 to 35 deg. F.

Storage cellars require low air velocity and a variation in humidity dependent on the type of cooperage. Wooden cooperage would dry out at too low a humidity. Furthermore, the comfort of the workmen must be considered.

Cooler rooms are constructed with

(*Turn to page 676*)

1, T. Moran (Research), Low Temperature Research Station, Cambridge, England; 2, A. W. Ewell (Ozone), Worcester Polytechnic Institute; 3, Maurice Piettre (Quick Freezing), Institut International du Froid, Paris, France; 4, R. Plank (Refrigeration), Kältetechnisches Institut, Technische Hochschule, Karlsruhe, Germany.

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Use of the Spectroscope in Food Research

By GEORGE R. HARRISON

Physics Department, Massachusetts Institute of Technology, Cambridge, Mass.

THE INCREASINGLY RECOGNIZED IMPORTANCE of detecting measuring minute traces of metals and other elements in foods, both from the standpoint of substances required by the body and of those producing harmful effects, has made desirable the development of more sensitive and accurate methods of study. This applies particularly to elements such as iron, copper, cobalt, manganese, lead and arsenic, when these are present in amounts too small to detect by ordinary chemical methods. Especially are such methods important for use on fruits or vegetables which have been sprayed for pest control, and for materials which have been canned or bottled. The spectrograph has been found to be an ideal tool for this group, since, with its aid, as little as one hundred-millionth of a gram of lead can be detected, and amounts far below the small quantities which are important for human consumption can be studied.

Manufacturers of such products as chocolate, condensed milk, chewing gum, and alcoholic beverages are turning increasingly to use of the spectrograph for testing their products, to make sure that semi-poisonous materials are kept well below the danger point. Even drinking water is tested for metallic impurities by this method in doubtful cases. Tests can be run quickly to compare impurities picked up by a given type of food when packaged in cans, bottles, or by other means. Extensive studies have been made on the copper content of cranberries from bogs which have been treated over a period of years with copper-containing sprays.

In measuring the metals present, the material is burned in an electric arc and the light which it emits is photographed with a spectrograph. With liquids, the instrument can be used in another way to study the absorption of light which passes through the material, and much progress in studying vitamins has been made in this way. The spectrograph is commonly used to measure cod liver and other oils for their vitamin-A content, and essential oils can be tested for strength and impurities with the same instrument.

Some manufacturers are using spectrographic methods for internally marking their products, by adding small quantities of some harmless impurity, not ordinarily found in the material, in amounts too small to detect by chemical methods. With the spectroscope they can detect their own product even when mislabelled or repackaged.

The Utilization of Whey in Food

By B. H. WEBB

Bureau of Dairy Industry
United States Department of Agriculture

A LARGE PORTION of the world's whey produced as a byproduct in cheese manufacture has always been a waste product. Out of 6,680,000,000 lb. of whey produced in 1935 in the United States, only about 705,000,000 lb. were utilized for the production of lactose, lactic acid and whey powder, leaving nearly six billion pounds for hog feed or waste. At present that whey which is not discarded by the cheese factory goes chiefly into stock, a very small portion being utilized as human food. The high nutritive value of whey has prompted the Bureau of Dairy Industry to investigate its use in food for man. The utilization of whey in common foods and the development of new whey products has been attempted.

Whey contains most of the minerals, lactose, and soluble protein of milk. Because of the low solubility of the milk sugar and the strong salt taste of the minerals, difficulties are encountered when whey solids are incorporated in many foods.

Whey, either in condensed or powdered form, was found to be a desirable way to improve the flavor and nutritive value of canned or homemade soups. Canned soups containing whey were processed with less danger of the development of an undesirable coagulation than when milk was used.

An attractive mixture of tomato juice and fresh whey was found useful either as a beverage or as a base for tomato soup.

A sweetened condensed whey, consisting of whey solids and sugar, was produced and found to have excellent keeping qualities and whipping properties. This material was developed to furnish a cheap source of whey solids in some new whey products. A new porous textured candy filling was made by drying whipped sweet whey. Canned fruit whips were manufactured by mixing sweet whey, fruit, and gelatin in the proper proportions. Sweet whey or whey powder added to jam allowed it to be whipped to double volume.

Composition of Whey and of Some New Whey Products

1. Approximate composition of separated, fat-free whey:

	Fresh whey Per cent	Whey powder Per cent
Lactose (milk sugar)	4.9	73.5
Ash	0.6	9.0
Protein (largely albumin and globulin)	0.9	13.5
Water	93.6	4.0

2. Approximate composition of some canned whey soups:

	Whey solids Per cent	Butterfat Per cent	Flour Per cent	Salt Per cent	Sugar Per cent	Vegetable juice and pulp Per cent	pH before processing
Celery	3.0	3.0	3.3	1.0	...	24	5.99
Tomato	4.5	3.0	2.8	1.0	1.2	70	4.43

3. Composition of canned tomato-whey juice:

Tomato juice	65.0 per cent
Fresh whey and whey cream	34.6 per cent
Salt	0.4 per cent

Served cold as a refreshing drink, or hot as soup with or without the addition of a thickener. Butterfat 2½ per cent.

4. Approximate composition of sweetened condensed whey:

Whey solids	37.5 per cent
Cane sugar	37.5 per cent
Water	25.0 per cent

A mixture of 7 lb. sugar per 100 lb. pasteurized whey is condensed under vacuum. Sweet whey whips to 200 to 300 per cent overrun in three to four minutes. The stability of the whip is five to ten hours.

5. Bureau of Dairy Industry "Wheyfers:"

Whipped sweet whey	80 per cent
"Pablum" or other cereal	5 per cent
Chopped nuts	15 per cent

The mixture is dried at a temperature below 100 deg. C. and coated with chocolate.

6. Approximate composition of canned fruit whips:

Fruit juice and pulp	25 to 50 per cent
Whey solids	14 per cent
Sugar	18 per cent
Gelatin	1 per cent

Reaction should be pH 4.5 or less, before processing.

To use: Whip product two to three minutes, place in serving dishes, chill well in refrigerator and serve.

Note: This is an approximate formula only. Adjustment of the fruit and sugar content is necessary with different fruits.

Merchandising
HINTS AND HURDLES

A Mammoth Order

FOOD INDUSTRIES has received during the current year many requests for accurate lists of chains, voluntary groups, super-markets, food manufacturers, old line wholesalers, specialty jobbers, wagon jobbers, brokers, etc. The accompanying tabulation compiled by the Research Department of Buckley, Dement & Co., at Chicago, indicates how nearly impossible it is to maintain an accurate list in any one of these classifications. There are more changes among wholesalers than in any other line of business. During the past year these changes averaged about 45 per cent. There has been a change of 25 per cent in grocery stores, 25 per cent in manufacturers rated above $10,000 per year. New stores have entered the field, old stores have closed or moved, or changed their names. FOOD INDUSTRIES sympathizes with the manufacturers and distributors who attempt to maintain an active, accurate list in any one of these classifications, because FOOD INDUSTRIES has found it impossible to maintain for its readers such accurate classification lists.

The percentage of changes in other retail lines are:

	Per Cent
Retail auto accessories	33
Men's clothing dealers	29
Delicatessen stores	32
Drug stores	27
Electric shops	31
Floor covering and drapery stores	29
Retail florists	27
Confectionery stores	31
General stores	27
Restaurants	28
Women's wear stores	29
Fruit and vegetable	31

Super-Market Recognition

Not long ago, many food manufacturers were refusing to sell their merchandise to super-markets. In spite of the fact that many super-markets bought and moved food products in carload lots, many manufacturers withheld from the super-market the privilege of selling their brands. Possibly they did not choose to have their products "footballed." Possibly they feared predatory price cutting. It is also possible that chains and organized groups of independents suggested to manufacturers that withholding sales of their products from super-markets might tend to stablize prices. At the Super-Market Institute meetings, Sept. 27, 28, in New York, however, the lion and the lamb bedded down together. Henceforth, they are "palsy-walsy." Many national food advertisers exhibited at the Super-Market Convention. Paul Willis, A.G.M.A. president, addressed the opening luncheon session with a strong bid for the super-markets support of so-called national brands. W. H. Albers, formerly helmsman of Kroger, now successful operator of his own group of super-markets in Cincinnati, Ohio, championed the national brand manufacturers' products and stated that in the future independents and super-markets will be aligned together on the side of the national brand manufacturer, in competition with chain units and their distributor brands of merchandise. Peace has been declared between super-markets and manufacturers but the war of the brands promises to be exhaustive and destructive.

All Del Monte products now carry the new "informative label" which California Packing Co. has been releasing during the last six months. Facts stated on these descriptive labels include: net weight of contents, size of can, size and number of pieces and nature of liquid.

Who Pays?

Dr. Melvin E. Copeland, professor of marketing, Harvard University Graduate School of Business Administration, in an address before the Boston Conference on Distribution, traced the trend of prices of commodities such as copper, lead, sugar, coffee, hides, silk, cotton, wool, butter, wheat, etc., throughout the period from 1925 to the present covering prices in the United States, England, France, Germany and various other countries for which price quotations are regularly available. The price level of these commodities has now returned to approximately the level of 1926, the price level at which the New Deal Administration intended to peg prices through the regulation of the gold content of the dollar. Dr. Copeland concluded his address by saying: "The question of the future trend of commodity prices, therefore, has a large political aspect. The deficit and the correlative monetary policy of the politically dominated Federal Reserve System tends to cause commodity prices to rise. That will lead to public resentment. On the other hand, any curtailment of federal expenditures or an effective increase in taxation which necessarily would hit "the man on the street," also would be unpopular.

"How will the great quarterback escape from that impasse?

"If past experience in this country and abroad were still of any significance, and if our affairs were not in the hands of a genius of unparalleled resourcefulness, I should expect commodity prices to go up at least another 50 per cent or so, with some zigzags in their course.

"With the price of basic raw ma-

terials rising possibly another 50 per cent, with the demands of labor for an increased proportion of the total income of industry and with the government's determination to appropriate an increasing proportion of the proceeds of industry for governmental operating expense, what alternative is there but to pass on these levies to the consumer? Can the consumer stand the strain—will he?"

Speaking of Trends

The early meetings of the Boston conference on distribution, starting in 1929, stressed the importance of profits. This year's conference made little reference to profits but emphasized the necessity of manufacturers, distributors and business men recognizing the responsibility of their position in the chaotic scheme of things today. Emphasized in these addresses were the relationships of business to labor, and to the consumer. Governmental policies and regulations and maintenance of international peace were important issues discussed. Past business practices were criticized because, it was pointed out, much of the chastisement administered to business in recent years has been due to management's shortsightedness.

While the speakers at the Boston conference, among them many of the country's ablest business leaders, do not abandon for business all hope of present and future profit, they stress the point that business should put its house in order and assume the responsibility of righting social and economic balances, which they believe can be more ably accomplished by business than by government bureaucracy.

Enter Mrs. Consumer

Throughout the Boston conference addresses, much emphasis was placed upon the importance of recognizing the consumer, and the consumer's influence on the distribution and the sales of manufactured commodities. The rapid advance of the consumer education movement has convinced at least some alert merchandisers of the importance of providing standards for consumer goods. Jules Labarthe, Jr., Mellon Institute, Pittsburgh, Pa., discussed the necessity for quality and quantity standards for measuring consumer goods to satisfy the demands of enlightened buyers. The trend is toward providing labels fully descriptive of the context, content, quality and quantity of such merchandise as can be so described. This standardization of measurement of merchandise applies less to food than other merchandise. No label can adequately classify or measure taste and flavor in standard units—the most valuable "ingredients" in food products. Many manufacturers of food will, however, find it practical to enlighten consumers as much as possible regarding the contents of containers through informative labels. Libby, McNeil & Libby labels and now California Packing Co.'s Del Monte labels are pioneering the trend.

Boon to Equipment Men?

Equipment manufacturers, especially those who manufacture bottle washers, will welcome the fact that at least one ketchup manufacturer is allowing a rebate or discount of 25 cents per case as advance payment for the return of empty ketchup bottles. Should this practice become general, sales of bottle washing equipment should materially increase. Does this ketchup maker intend to reclaim the ketchup remaining in the empty bottles, extract and concentrate the valuable vitamins, and convert the remainder into fertilizer? Would the recovery of these by-products go far toward covering the cost of transportation on the returned empties as well as the discount allowance. However, manufacturers of bottle washing equipment should be happy, even gleeful, because the discount which was originally extended to restaurants and institutions is now being extended to at least a few chosen retailers. The contagion may spread.

Taxes Beget More Taxes

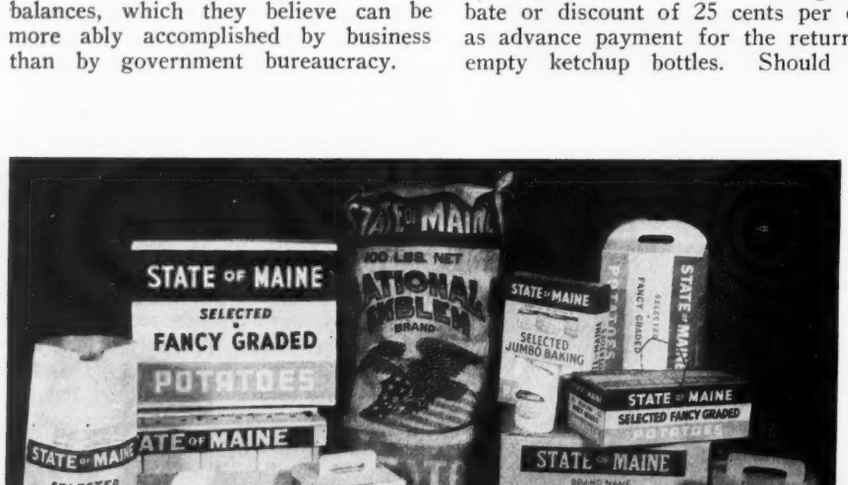
In discussing the increasing tax placed upon business by our 175,000 local, state and federal governments, Alfred E. Buehler, professor of economics, University of Vermont, in an address before the Boston Conference on Distribution, stated that if past experience may be taken as a guide the government is more likely to rely upon higher tax payments in balancing its budget than upon reductions in expenditures. In discussing discriminatory chain store taxes, he pointed out the necessity of chains to turn to super-markets or similar large volume units of distribution. He pointed out further the possibility of local state and federal governments taxing not only the chains but also all other retail distributors. Prices to the consumer must rise. Relative price increases pave the way for consumer co-ops, which consumers will organize in retaliation. It is difficult to picture extensive consumer co-op distribution of foods in this country; however only a few years ago it would have been difficult to visualize things as they are today.

Gone to the Dogs

Beware when you say that a man has gone to the bow-wows, for that expression will henceforth carry the new implication of "softie" or "panty-waist." A new confection "Happydog" candy, product of Walter B. Stephens Co., New York, is now manufactured as a canine dessert.

A Food-Minded Prison

The article "What is a Super-Market?" which appeared in the August issue of FOOD INDUSTRIES was reprinted in "The Prison Mirror," Stillwater, (Minn.) Prison's "house organ." One wonders why the editor chose this article which discusses the merchandising methods of supermarkets, chains and independents. Was it because of inmates' past interests or was it to stimulate future interest?



"State of Maine Potatoes" will come to market this year glorified by brand name and distinctive package. State of Maine potatoes will be offered in containers holding from ½ dozen separately wrapped baking potatoes to 100 lb. Consumers will have their choice of box, bag or sack. Any and all of the large variety of packages is suitable for forceful mass display.

Retailers Pioneer an Idea

With the aid of these illustrated food pages, I.G.A. built a one-week merchandising event which reaped sales of 2,740,000 lb. of dried fruit for I.G.A. members.

MORE THAN A YEAR AGO one of the largest corporate chains recognized the promotional value of an illustrated food page in one of the women's magazines. This page pictured, in colors, cakes iced with pastel frostings, the color and flavor of which were the result of adding jelly to egg-whites. The chain planned a merchandising event based on this food page to sell large and small cakes and jellies and also to produce store traffic. From the magazine the chain obtained reprints from which to prepare posters for more than a thousand of the chain's units. The merchandising event was backed by newspaper and handbill advertising, even by store demonstrators. An official of the company commented: "The entire promotion met with very good consumer response and we are very satisfied with the results secured."

Merchandise promotion means one thing to manufacturers, another to distributors. To the manufacturer of canned beans, promotion means increased sales of canned beans—his beans. To the distributor, promotion means store traffic—possibly through the promotion of beans.

The idea that can be developed to stimulate general consumer interest, the idea that can be dramatized with showmanship to create store traffic, is "a natural" in the eyes of the retailer. The manufacturer who recognizes ways and means whereby his product may become the vehicle in creating store traffic for retailers will have no difficulty in obtaining in retail outlets ample displays and sound support for his product.

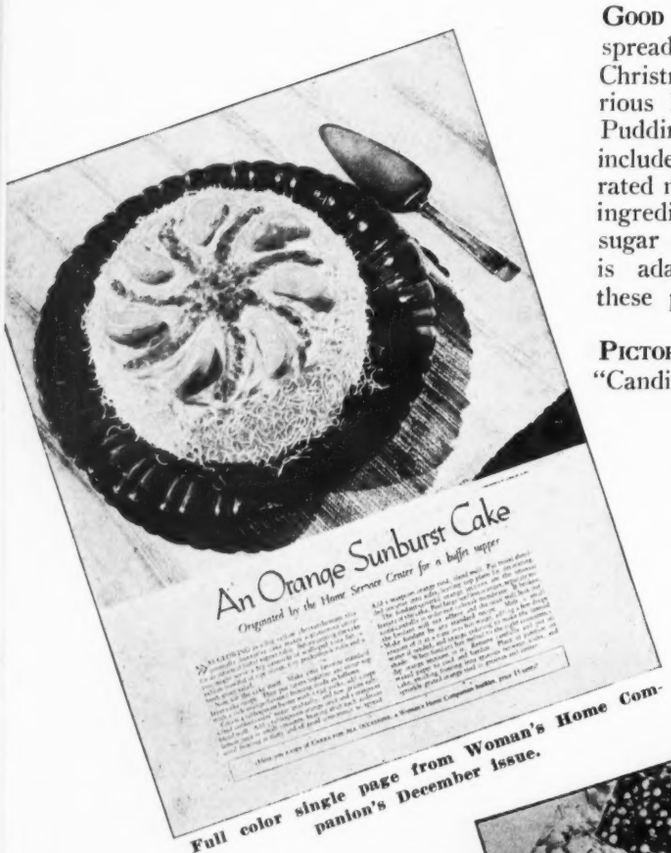
Independent groups as well as chains have recognized the showmanship possibilities inherent in the food pages of the women's magazine. I.G.A. stores built a merchandising event about a woman's magazine food page which provided recipes for and illustrated dishes made with dried fruits. An accompanying article pictured and described a miniature circus with animal characters made of fried fruits. During this event, 520,000 reprints of the illustrated two-color food pages were distributed in I.G.A. stores. One I.G.A. wholesaler supported the campaign with radio advertising. Newspaper advertising supported the event and throughout I.G.A. territory 2,500,000 handbills were distributed by I.G.A. grocers. I.G.A. members built dried fruit window and table displays about mounted reprints of the food pages of the women's magazine. Commenting on the results and the interest created by these displays, I.G.A.'s J. Sidney Johnson stated: "This window caused the sidewalks in the front of this store to be blocked any number of

(*Turn to page 656*)

Suggestions for Lenten dishes, a food page feature of a woman's magazine was successfully employed by Safeway Stores to create impulse sales of canned fish and other Lenten items.

FISH COMES TO THE RESCUE!
BY JULIA LEE WRIGHT
ARE YOU DESPERATE FOR GOOD NEW MAIN DISHES—WAYS TO VARY LENTEN MEALS? THEN READ THIS

from December



Full color single page from Woman's Home Companion's December issue.

GOOD HOUSEKEEPING: Full color spread with recipes for making Christmas pastries, among them various kinds of cookies and a "Fig Pudding." Ingredients for the latter include packaged figs, canned evaporated milk and package flour. Cookie ingredients include flour, powdered sugar and shortening. The display is adaptable to manufacturers of these products.

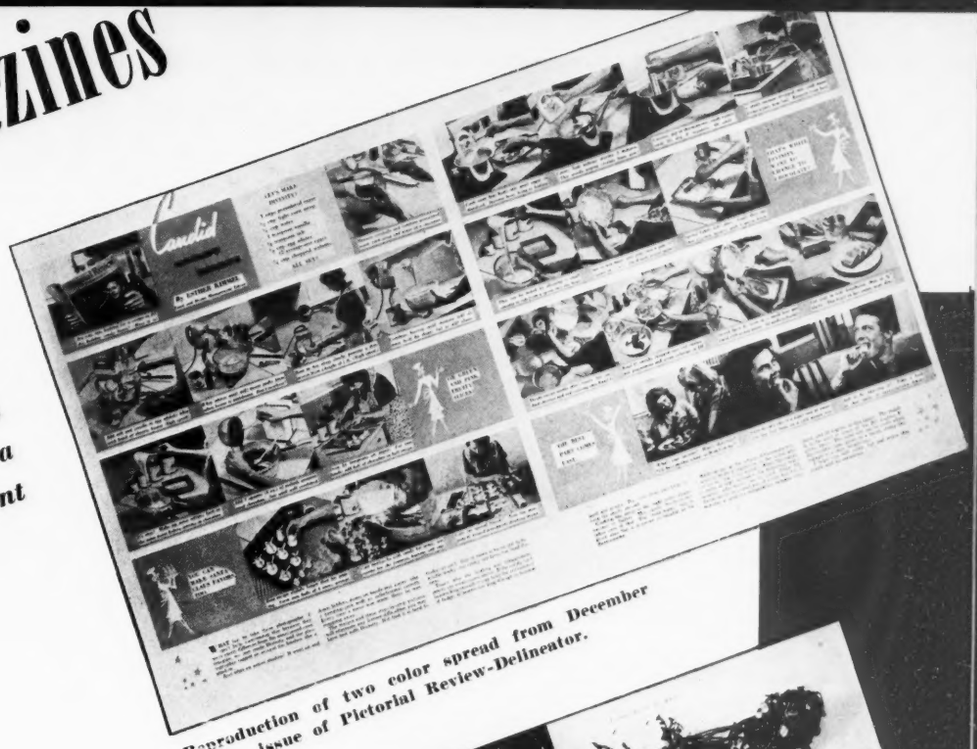
PICTORIAL REVIEW-DELINEATOR: "Candied Candy Shots" in two colors illustrates and describes method of making divinity candy "to fill the holiday candy boxes." This spread should stimulate the sale of sugar, corn syrup and flavoring extracts.

LADIES' HOME JOURNAL: Full color spread illustrating a Christmas Eve supper table. Items featured are waffles and syrup, thin sliced ham, peach halves with raisin filling, and tomato juice sherbet. The spread should aid the sale of canned peaches, packaged raisins, tomato juice, gelatine, boiled ham, ingredients for making waffles and various kinds of syrups and jams.

Full color spread appearing in the December issue of Good Housekeeping

Women's Magazines

The women's magazine food pages reproduced here can be used by those manufacturers whose products they include as the basis on which to build a productive merchandising event



Reproduction of two color spread from December issue of Pictorial Review-Delineator.

McCall's: Color spread of Christmas desserts—pies, plum pudding and fruit cake. Posters made from reprints of this spread should boost the sales of manufacturers who make canned plum pudding, canned cranberries or canned cranberry jelly, canned sweet potatoes, bakery-made fruit cakes and bakery pies.

Woman's Home Companion: Single page in full color presenting "An Orange Sunburst Cake" with directions for preparing an orange flavored coconut frosting. Suitable for use at point of sale by manufacturers of bakery cakes and packaged shredded coconut. Additional four-column illustrated black and white food pages suitable for point of sale promotion of manufacturers of gelatine, candied fruits and packaged rice.

Full color spread from the December i Ladies' Home Journal

• Reprints of these pages mounted to make posters may be obtained from the respective magazines before or by the time the magazines reach their readers ***(see p. 656).***

This full color food page spread appears in McCall's December issue.

Safeway inside display built around a blown up women's magazine food page.

This woman's food page, featuring pastel cake frosting, was used by a chain store to stimulate store traffic and increase the sale of cakes and jellies.

times with people looking at the window and particularly at the figures . . . certainly no window we've ever put in has attracted so much attention and brought so many favorable comments and it really sold *fruits*." I.G.A. dried fruit sales, as a result of this one week's promotion, were 2,740,150 lb.

Safeway stores centered its 1936 Lenten campaign about a women's magazine food page, which furnished recipes for and illustrated Lenten dishes. The object of this campaign was dual—to create store traffic and stimulate sales of canned fish and other Lenten items. 225,000 reprints of the magazine's food pages were distributed by Safeway and Sanitary Division Stores. Safeway bolstered the campaign with newspaper advertising, with radio announcements, and with over 400,000 distributed handbills. "Blow-ups" of the illustrated magazine articles were used in 3,100 Safeway stores, as the focal point for window displays, table displays and floor displays. A Safeway official made two significant comments regarding this Lenten sales promotion: "As you no doubt know, this is the first time my organization has ever done anything of this type. . . . This is more (support) than any manufacturer that we work with has ever received to my knowledge. I might say that in the five years that I have been with this company, I have never had such enthusiastic response from the divisional managers as I had to my letter asking for cooperation (in the Lenten drive)."

The manufacturer who provides his retail dealers with sound merchandising ideas which permit showmanship of a kind that builds store traffic will not find it necessary to buy "dealer influence" with unlawful discounts.

Mounted reprints of food pages in lots of not less than 1,000, single-pages on 14x22 in. posterboards, spreads on 28x22 in. posterboards, may be obtained from the magazines ready for use, at moderate prices (actual cost).

Each poster will carry the printed line "As Seen in November Issue of ..... magazine." The manufacturer's selection of caption or selling "slug" such as "Try this salad tonight", "*Ladies' Home Journal* Meal of the Month," etc., will be printed at the top of the poster. No posters will bear the name of a manufacturer or trade brand.

Above, I.G.A. window display, part of a merchandising event centered about the illustrated food pages of a woman's magazine. Below, Safeway store window during a Lenten promotion based on woman's magazine food pages.

Beer Retailing Improved by New Equipment

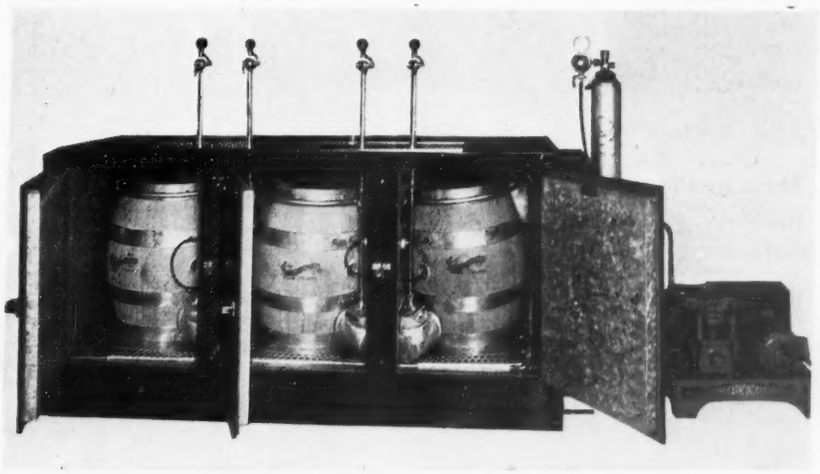
IN THE DAYS BEFORE PROHIBITION, brewers themselves serviced saloons and retail beer outlets to insure that their product was dispensed at the proper temperature and that beer dispensing equipment was kept sanitary and free from bacteria and mold. Since the return of legal beer, brewers are not permitted to control, regulate or supervise the retail dispensing of their product. But with the new crop of saloon keepers and beer parlor operators, came ignorance of the sensitive beverage they dispensed. Bottled and canned beer sales therefore are increasing at the expense of keg or draft beer largely because of the lack of proper care and sanitary control in the dispensing of draft beer, and the corresponding loss of flavor. Keg beer is the favorite of brewer and retailer because of the greater profit from draft beer.

Recently, in the Anheuser-Busch research laboratories in St. Louis, a dedevice, invented by John M. Bruce to improve the method of dispensing draft beer, has been tested and perfected. This device promises to bring to the consumer uncontaminated beer at the proper temperature, through those retail outlets which employ it. The old beer coils and hose connections apparently are responsible for the contamination of beer, as well as the lack of temperature control. The new equipment eliminates the old beer coil. In the retail outlet, temperature within the keg is maintained by a cold brine tank and chilling coils in the compartment below the kegs. Incoming warm kegs are rapidly cooled by a cold brine spray on the outside of the keg. Temperature control of the beer is maintained at all times by thermostatic control of the pump that circulates the cold brine.

"Brubox" the trade name of the newly perfected device, eliminates ice, ice-box, coils and hose connections, and delivers beer to the dispensing tap through a few feet of small bore block-tin-lined straight pipe. "Brubox," it is claimed, not only delivers uncontaminated beer at the proper temperature but also more glasses of beer per barrel. It is further claimed that the cost of thermostat controlled mechanical refrigeration plus the rent for the "Brubox" equipment does not exceed the cost of icing the same amount of beer. "Brubox" equipment is not sold to retail outlets but rented. Worthington Pump Company, manufacturers of the "Brubox," will control servicing of the equipment. Cleaning, adjusting and replacing broken parts are not at the expense of the retailer. The dealer does not even have the responsibility of cleaning the service taps. Discharge pipe, service taps and arms are removed each week by the Brubox serviceman and replaced with fresh taps and arms which have been thoroughly sterilized and scientifically cleaned in the home of "Brubox", where they are sterilized. They are packed in an air-tight sealed box, contamination proof.

In addition to a guarantee of more savory beer, an increase of beer servings equivalent to a saving of $1.50 per half-barrel is also guaranteed as a part of the lease by the leasors of the "Brubox" equipment.

Discharge pipes, service taps and arms are removed and sterilized each week. Cleaned sterilized parts are packed in a sealed box before returning to the retail outlet.



Note the absence of ice box and beer coils in the "Brubox."

the housewife clip the label along the seam to find recipes and descriptive copy on the reverse side. Fruits and Peels is a mixture of diced citron, cherries, orange peel, lemon peel and pineapple.

Device for Key-Opened Cans

THERE ARE MANY DEVICES in use for fastening to key-opened cans the key for opening them. William Underwood Co., Boston, Mass., is using a new device for attaching the key to the key-opened can container for "steamed fudge pudding." The key is machine attached to the bottom of the can by a small strip of gummed, transparent cellulose.

Bid for Volume Sales

"NIBLET-EARS" corn-on-the-cob, product of Minnesota Valley Canning Co., LeSueur, Minn., was originally packed in a small can containing four whole ears of corn-on-the-cob to the can. The product has recently been introduced in a much larger can, twelve whole ears to the can. Niblet-Ears in the large cans, twelve ears to the can, has found acceptance in Eastern markets, especially in the super-markets, even during the fresh corn season. Super-market operators report that the bulk of the sales of this product are made to men.

New

Turn to Pioneering

IN THE HIGHLY COMPETITIVE FOOD FIELD, many manufacturers have found it helpful to both sales volume and profits, to add to their list of products new ones without established competition. Libby, McNeill & Libby, Chicago, has recently added to its long list of products a new one — canned meat gravy. S. S. Pierce Co., Boston, Mass., has recently added "Macaroni and Cheese with Cream Sauce." These products enter fields of minimum competition.

New Appeal in Peels

CANNED MIXED FRUITS and peels, candied, is the newest product of Hills Bros. Co., New York. There are two unusual features about "Fruits and Peels" label, which shows a cut of a fruit-cake, the most popular use for the product. The appearance of the content is pictured by means of an embossed cardboard cutout tightly inserted in the end of the can. This cutout carries a reproduction in full colors of the mixed fruits and peels. Instructions on the label suggest that

PACKAGES AND PRODUCTS

And They Stay "Softenized"

CALIFORNIA FIG GROWERS AND PACKERS, Fresno, Calif., have recently introduced "Blue Ribbon" "softenized" figs packed in foil-wrapped cartons. Calimyrna figs are packed in containers with gold and red wrappers, Black Mission fig colors are silver and red. Both products are sold with a 100 per cent keeping quality guarantee which includes permanence of softness.

in cans. T-N-T are initials standing for tender, nutritious and tasty. The can with a wick fuse projecting from the top represents a giant firecracker, chosen to convey the idea of the high explosiveness of the kernels of Barteldes popcorn. Cans on grocers' shelves have proved stoppers especially for youngsters of the cannon cracker age.

Boxed Kisses

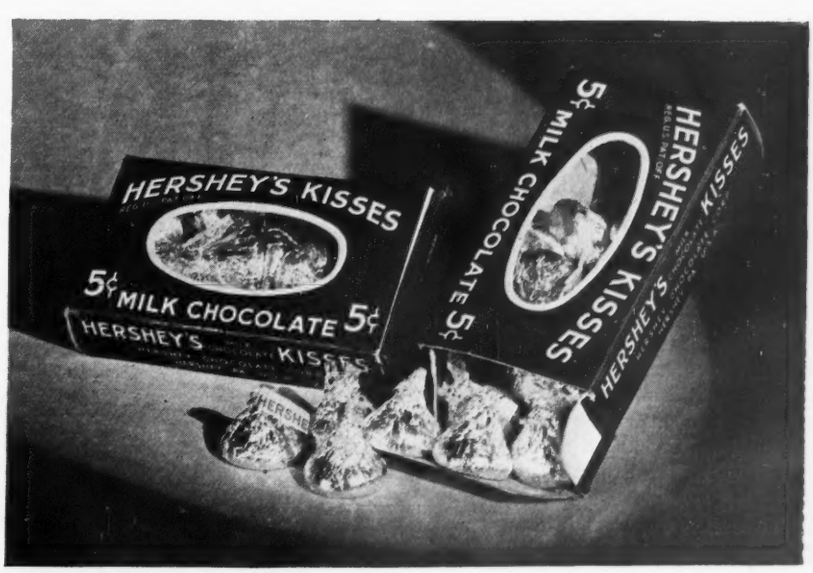
HERSHEY'S KISSES, long familiar in bulk and large transparent bag containers, are now packed in small paperboard boxes with transparent windows. This is an adaption of the Hershey Kiss to the popular 5 cent size seller. The product is sold through grocery stores as well as through the drug stores.

Paperboard for Roquefort

ROQUEFORT CHEESE in consumer packages has long been on the market in familiar wedge-shaped metal-foil wrapped discs. Roquefort spread has been offered to the consumer in glass tumblers of various sizes. "Lion Brand" French cheese spread, imported Roquefort cheese blended with sweet cream, is now on the Eastern market, packaged in 3 oz. paperboard containers. The cheese is first wrapped in glassine paper with foil backing.

Aim to Sell the Youngster

THE BARTELDES SEED CO., Denver, Colo., has chosen as a trade name "T-N-T" for popping corn marketed



Meat Packer Finds SMALL Trucks *More Economical*

Detroit provision house uses open-top bodies without spoilage of goods and with savings in cost

IN THE 78 YEARS which have elapsed since its founding in 1859, Hammond Standish & Co., Detroit, has made many changes in the character of its delivery equipment. One of the first truck users in the citadel of the automotive industry, its first self-propelled vehicles were the slow and heavy three and five-ton trucks which lumbered along on solid tires. Then came the development of the pneumatic tire. Hammond Standish was not slow to keep pace with the trend and so refitted what trucks it could with pneumatic tires and purchased new trucks so equipped.

Next came the closer combing of the sales market, the growth of more wholesale outlets over an ever increasing area and the need for greater frequency of deliveries, which in turn required a greater speed in delivery.

In the span of motortruck development from around 1910 down to the present, the capacity of the Hammond Standish trucks has gone down steadily, while the vehicle speed has gone upward just as steadily. Today, one of the company's longer-run trucks is governed to a road speed of 40 miles per hour.

For 1937, the Hammond Standish active fleet consists of 25 trucks, this number including nineteen Federals, two Reos and four Fords. The Fords, the newest units of the fleet, have unusual bodies and carry loads of not over three tons.

At the present time, this fleet delivers a volume of 1,000,000 lb. a week to retail outlets, butchers, markets, hotels and the like. The goods delivered consist of dressed beef, veal, pork and a complete line of provisions such as pork loins, hams and sausages.

Deliveries are made roughly within a radius of 50 miles of Detroit. No deliveries are made across the Detroit River into Canada, although some of the company's livestock comes from Canada.

To outlets in Detroit proper and in the closer nearby cities, deliveries are made daily, the more distant points being reached every other day. The trucks average 90 stops a day, which explains in part the need for speed in delivery, including quick acceleration. It also explains why the trend has been toward the smaller units.

The truck drivers are primarily deliverymen, that is, they do not solicit business from the truck one day and deliver it the next. Nor do they load up their trucks with assorted merchandise and attempt to dispose of it by calling on the customers along their routes. Instead, Hammond Standish employs a separate force of salesmen who call on the trade and phone their orders in to the plant several times during the day for delivery on the day following. This does not mean, however, that the truck drivers are not considered important cogs in the selling scheme, because they are.

One of the new Fords, with its 10-ft., open-top body. Note the relatively short body overhang to prevent overloading beyond 6,000 lb. Tires are 700x20 balloons.

One of a fleet of Federals owned by Hammond Standish & Co., Detroit. The bodies are painted almost a canary yellow, with lettering of the same color on a contrasting black panel.

All the Hammond Standish salesmen take their vacations during the week of July 4, and at this time the drivers solicit from the trucks and deliver on the day following. New salesmen are made from the most promising material among the driver force.

A few helpers are employed in the congested areas either to speed up deliveries or to prevent theft. These helpers are promoted to drivers whenever a vacancy occurs.

The company feels that its drivers have played, and still play, an important part in getting and retaining business and in helping to reduce delivery expense. Most of the drivers have been working for the company for long periods. Working under good conditions with fair pay, though not unionized, the men feel that it is their company.

The writer, in calling upon Harry M. Schulman, superintendent of plant and equipment at the Detroit office, was surprised to find the walls of Mr. Schulman's room almost covered with plaques won by the drivers in safety contests. Mr. Schulman is very proud of the record made by his men and says it has contributed a great deal toward low truck maintenance.

Four of the Hammond Standish drivers have driven six complete years without an accident. One has gone 5½ years; one, 4½ years; one, 3 years, one, 1½ years; and six, one year.

Getting back to the truck equipment itself, one of the latest units, a Ford, is shown in one of the accompanying illustrations. It has a rated load capacity of 3,000 lb., but is fitted with "helper" springs and 700x20 balloon tires so that it can carry up to 6,000 lb. It is equipped with an open-top, tarpaulin-covered body which is neither refrigerated nor insulated.

In answer to questions put as to why some sort of closed body, either insulated or refrigerated, was not used for summer and winter protection of the goods carried, or to meet the competition of some other packers using such equipment as a sales builder, Mr. Schulman replied essentially in these words:

"All of our merchandise is double paper wrapped. It is kept in our ice boxes until just prior to loading into the truck bodies. Our trucks are out on the routes only from six to eight hours. We have perhaps a dozen extremely hot days during the summer season and perhaps a like number of extremely cold days during the winter period.

"Under such conditions and with the spoilage of goods out on the routes practically nil, we do not believe a heavy, closed, panel-type body with doors, either insulated or refrigerated, can be justified as to necessity, first cost or cost of upkeep.

"We believe our Ford body is good looking. It is low in first cost and upkeep expense, relatively light in weight, easy to keep clean and convenient for the driver to deliver from. It is made from oak and is purposely only 68 in. wide and 10 ft. long so as to make it difficult to overload with more than 6,000 lb. of goods. A removable panel is fitted on the right-hand side of the body to facilitate sidewalk deliveries.

"Protection against rain is provided by a tarpaulin. This is made of good-quality material, and its proper use by the driver has prevented losses due to wetting of the goods."

Another question was brought up as to whether the general increase in drivers' wages in most industries, during the past year or two, had made it necessary to revamp the handling of the goods inside the plant. The purpose of such a change would be to get the trucks out earlier and offset the increased driver wages by greater truck production. In answer to this question, Mr. Schulman replied:

"Our driver-wage scale has undergone no excessive change upward. However, we do have what we consider a very efficient method of putting up orders.

"Our 35 salesmen telephone their orders in to our order clerk several times during the day instead of waiting until the end of the day. This obviates the necessity of a packing rush at night.

"Each customer is cataloged as to credit and has a route number and a stop number on that route. When the telephoned order is written out by the order clerk, it is marked C.O.D. or charge, and given numbers such as R1-S12, meaning stop 12 on route 1.

"This order is then sent by pneumatic-tube to the department where it is to be put up. When this is done, a tag with the proper route number printed on it is attached to the package and the stop number written on in pencil. All goods for each route are grouped together, and delivery sheets are made out in advance of the truck's arrival the next morning.

"The assembled loads are picked up by the driver at two points. He first gets the pork items at the pork division and then moves to the beef-division icebox platform for the beef items, consolidates the two and is away on his route."

Two of the Hammond Standish "old-timers," both Federals. The one on the right, now equipped with pneumatic tires instead of the solid ones shown, has been in service since 1925. It is still giving a good account of itself on the streets of Detroit.

The PLANT NOTEBOOK

How to Select Steam Traps

No plant can be operated safely and economically unless the traps are correctly selected. Although the function of all traps is to separate water from steam, some traps are designed to accomplish this end with safety as the primary consideration, while other traps aim at economy. To install an economy trap, where the call is for a safety trap, is dangerous business; while to use a safety trap where economy is required is poor business.

Steam is used either for power, as for driving engines, turbines and pumps, or for its heat value, as in process work. In the former case the mechanical trap —bucket, float or tilting—should be used, since the water of condensation must be removed rapidly and without waiting for a reduction in temperature, which is necessary with the thermostatic trap.

Because thermostatic traps operate by virtue of lowering of the temperature they are for that reason more economical. Assuming a steam pressure of 100 lb., a mechanical trap discharge temperature will be 338 deg. F., but the condensate coming from a thermostatic trap will be 25 to 50 deg. lower in temperature, and special thermostatic traps can be made to operate with a reduction of temperature much more than that. A 50 degree reduction in the temperature of the condensate means a gain in efficiency of close to 70 per cent, provided the plant has more than ample exhaust steam. But if there is no excess exhaust steam, there is no advantage in lowering the condensate temperature because the heat is returned to the boiler.

Where the point of utilization of the steam is at some distance from the boiler room, in many cases the return of the condensate is not economical. Then the thermostatic trap is especially preferable as an economy measure since it is possible to reduce the temperature of the condensate considerably before discharging it to waste. In certain process applications the thermostatic trap can serve a double purpose, for by adjusting the discharge temperature a simple means of temperature control is provided without the necessity of investing in equipment especially for that purpose.

Thermostatic traps are also usually lower in first cost and occupy less space, and in the smaller sizes can be used in place of ordinary fittings.

A good rule to follow is to use mechanical traps when the steam is used for power and thermostatic traps in heating and process work such as evaporating, cooking, drying and baking. However, this is a general rule, and instead of using it blindly, all factors should be taken into consideration in the selection of traps.—N. T. Pef, *Chicago, Ill.*

Ropes for Safety

Among many different safety measures which may be used in hazardous locations, the practice of considering a rope attached to the body, and using it when it appears advantageous from the standpoint of safety, is one of especial value. There are many, many times, when men go into hazardous places, where a rope attached to their bodies would make an excellent safeguard, and not infrequently, this provision has been known to save a life. The belt used by window washers on tall buildings is an adaptation of the same idea. If the window washer loses his footing on the window sill the belt will hold him.

There are many times when men are called upon to work in high places where a slip may easily mean death. Scaffolds are sometimes placed, of necessity, in such manner that they may be knocked over. Ladders are set where there is a measure of uncertainty in the same respect. In either case, a rope looped and secured loosely under the armpits will make the job perfectly safe. The other end of the rope will be secured to a fastening on the ceiling or somewhere above, and just enough slack allowed to make for a reasonable amount of comfort in working.

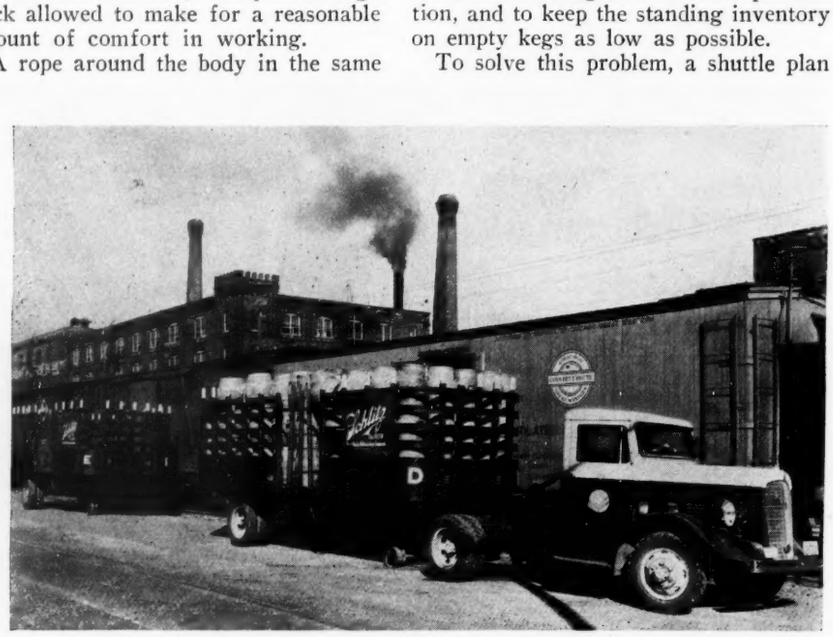
A rope around the body in the same manner is highly useful where there is any chance of earth, ashes, grain or what have you caving in and covering a man. Where a man is working in a trench where an excavation is being made for a pipe line, or descends into an ash bunker, or down into a grain bin or other dry storage bin, where there is a chance of cave-in, a helper or two on top to watch and to use the rope for hauling up in case of emergency, is a wise precaution indeed.

Other locations there are where possible suffocation may be guarded against in the same way. Workers going down into old shafts or storage cisterns may expect to encounter bad air or gas, and should be protected with a rope under the arms. Again, a man may find it necessary to go into a duct, into a sewer manhole, or even into the boiler breeching for one purpose or another. Where one goes into such a location head first, with a helper left behind to hold the rope, it is better securely tied around an ankle. If one backs into the opening away from the helper, the rope will go under the arms as usual.—John E. Hyler, *Peoria, Ill.*

Semi-Trailers Used for Block-Long Haul

The Jos. Schlitz Brewing Company, Milwaukee, has solved a problem of saving time in unloading empty beer kegs from incoming freight cars. It was important to combine speed with efficiency to save demurrage, to increase production, and to keep the standing inventory on empty kegs as low as possible.

To solve this problem, a shuttle plan



Shuttle for empty beer kegs employs two tractors and eight semi-trailers.

was worked out whereby more than 25 big freight cars could be easily unloaded within a day.

The Schlitz Company bought eight fully automatic, 100 per cent cab-controlled trailers and two tractors for use in the proposed shuttle service. A tractor hauls an empty trailer to the doorway of a loaded freight car, uncouples, and moves on to another freight car where a trailer loaded with empty kegs is waiting to be hauled to the company's wash house, only a few feet distant. Dropping the trailer at the wash house, the tractor picks up an emptied trailer, takes it back to a freight car for re-loading, picks up another already loaded trailer and then repeats the operation.

It is estimated that each of the eight trailers is picked up and dropped from 20 to 40 times daily. Operation is speeded up by the fact that the driver can connect or disconnect power brakes or lights without leaving his seat. It is interesting to note that all eight trailers and the two tractors operate entirely within an area of less than a city block.

The brewing company, it is said, has found this new arrangement to be eminently satisfactory. It fills not only the requirements of lessening demurrage and stepping up production, but also opens up all the company's direct railroad sidings for the exclusive use of out-going beer shipments. Thus, production on both ends is carried on uninterruptedly and independently.

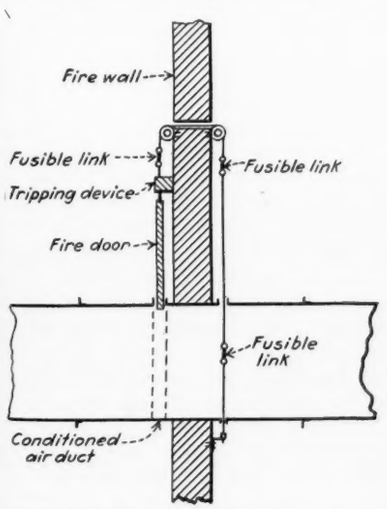
The semi-trailer units, supplied by Highway Trailer Co., have standard open stake bodies. The tractors were made by Four Wheel Drive Auto Co., Clintonville, Wis.—*Source of information,* HIGHWAY TRAILER CO., *Edgerton, Wis.*

Preventing Spread of Fire

Centralized air conditioning systems using ducts for the distribution and recirculation of conditioned air to the various rooms in the plant or building are becoming increasingly common in industry. A question often raised when deciding upon the merits of the centralized system versus unit conditioners in each individual room is how, with the centralized system, can a possible fire in one section be prevented from spreading to another section. This problem has been solved in one large installation of a centralized type by providing fire doors in the conditioned air ducts wherever they pass through a fire wall.

As shown in the sketch, these doors are held in the open position by fusible links located on both sides of the wall and within the duct itself. In the event of fire the links melt releasing the door, which drops, closing the duct, and thus preventing the further spread of flames.

Depending upon their location and the proximity of inflammable materials, these doors are constructed of either standard fire door materials, iron plates, or a metal frame covered with homogeneous fire resistant sheeting such as Transite.—SAM. HENRY, *Sandusky, O.*



Method of mounting fire door in air conditioning duct.

How auto jack is used to make conveyor operate by gravity.

Automobile Jack Makes Conveyor Work

A 1-ton, 2-stage hydraulic jack is used in our ice cream plant to raise the outer end of a roller conveyor, so that returned product will move toward the opening of the sharp freezer room.

When trucks are loading, the jack is lowered. Then products move down the conveyor in the opposite directions, from room to truck

The inner end of the conveyor, as shown in the photo, is hinged and anchored on an even sliding plane with the opening. The jack is located 8 ft. from hinged end. This gives the outer end of the conveyor an up and down travel of over 1 ft.

When first experiments were made with this arrangement, it was found that 4 in. off level in 12 ft. (length of unit) would cause boxes or cans to move, but 2 in. more travel each way made gravity handling easy and sure. —CARL RICHARDS, *Chicago, Ill.*

Chocolate kettle with welded steel impeller.

Steel Impeller Cuts Costs

Chocolate kettle maintenance in our plant not only became troublesome but very costly on account of the cast iron impeller being so easily broken in the semi-molten chocolate which bore the appearance of a liquid when the operator switched on the power.

We overcame this trouble by fabricating a steel impeller with the acetylene torch and using a $\frac{3}{8}$ in. brass driving pin in the hub.

When the chocolate is thick the steel impeller wades through it nicely. When the chocolate is fully congealed, the brass pin is calculated to shear off and release the drive shaft. Many months have gone by since we changed to this steel construction and not another penny of maintenance has it cost.—BILLIE BURGAN, *San Diego, Calif.*

New DISCOVERIES AND INVENTIONS

METHODS OF PRESERVATION

Gas Storage of Fruit

IN EXPERIMENTS on the storage of apples in atmospheres containing various concentrations of nitrogen and carbon dioxide, the best results were obtained at a concentration of 5 per cent carbon dioxide and a temperature of 38 deg. F. Pears were kept in a hard, green condition when stored in 10 per cent carbon dioxide or 100 per cent nitrogen in contrast to rapid deterioration in fruit stored in air. Apples kept in 100 per cent nitrogen for one week, and then stored under usual conditions remained in excellent condition for approximately seven months, and developed and retained a good flavor.

Digest from 73d Annual Report of the Nova Scotia Fruit Growers Assn. 1936, pp. 72–9.

How Acidity Varies In Pickle Fermentations

WHEN FERMENTING CUCUMBER PICKLES, the titrable or total acidity is greater the weaker the brine strength during the fermentation period. Also pH varies directly with the brine strength.

Small sized cucumbers cause highest total acidity, and large sized cucumbers cause the lowest total acidity development.

Digest from "Some Changes in Brine Composition Occuring During the Salting of Cucumbers," by I. D. Jones, North Carolina Agricultural Exp. Station, at Am. Chem. Soc. Meeting, Rochester, N. Y. Sept. 6–10, 1937.

PACKAGING

Laminated Foil for Frozen Poultry

FROZEN POULTRY packed in laminated aluminum foil covered on both sides with waxed paper were stored for five months at –10 deg. C. in this way. The birds were thawed down, cooked and eaten by several people, who without exception found them excellent in every way, and indistinguishable from freshly cooked chickens.

Digest from *Report of the Food Investigation Board for the year 1936.* (Published in England.)

Paper Backed Polystyrene Food Wrappers

FOOD PRODUCTS which are sensitive to moisture can be effectively protected by wrappers, bags or box linings of reinforced polystyrene foil. A thin sheet of polystyrene resin is stretched in all directions while in a plastic condition and the resulting foil, which may be about 0.0004 in. thick, is cemented to strong tear-resistant paper or fabric. As disclosed in British Patent 465,555 (granted June 10, 1937, to Norddeutsche Seekabelwerke Akt.-Ges., Nordenheim, Oldenburg, Germany), this method gives a moisture-proof wrapping material with high resistance to tearing.

Bags, boxes or cases may be made of or lined with this foil for protection of any food or tobacco product which loses freshness or any other desirable property when exposed to moisture. If an extra measure of moisture-proofness is desired, the paper or fabric reinforcement may be coated on both sides with the polystyrene foil. Firm adhesion of the foil to its support is obtained by soaking the foil in an organic solvent such as benzene (alone or in admixture with gasoline or alcohol), before pressing the foil on its support.

BAKING

To Restrain Protein Degradation During Dough Fermentation

MALT EXTRACT is useful in dough fermentation because of its diastatic power, but it has a tendency to make the dough excessively soft by protein degradation. According to British Patents 464,855 and 464,857 (granted July 22, 1937, to Aktieselskabet Dansk Gaerings-Industri, Copenhagen, Denmark) the proteolytic enzymes of malt extract, which are responsible for this deleterious action on proteins, can be inactivated by adding a small quantity of an oxidizing agent. Similarly, dry yeast often exhibits too much proteolytic activity when used in baking, and this undesirable action can be restrained in the same way. As an example, a malt extract which was unsatisfactory because of soft dough became entirely satisfactory when mixed with only 0.13 per cent of potassium iodate. Potassium bromate, like the iodate, is a powerful oxidizing agent and can be used in the same way for protecting the proteins in dough from degradation by malt or yeast enzymes. Thus, three parts of powdered potassium bromate in 900 parts of dry yeast will suffice to avoid the soft dough which commonly results from the use of dry yeast for leavening.

Mixing Doughs in a Vacuum

MIXING DOUGHS in a vacuum shows what part oxygen and air normally play in the mixing of bread doughs. When doughs are vacuum mixed for periods increasing from five to forty minutes, the result is a smooth, dense dough, one and a quarter times the density of water, but which gives a normal loaf on baking. Replacing the vacuum by hydrogen or nitrogen gases resulted in soft doughs, too sticky to handle. These were no more dense than water and contained one fifth their volume of gas. They fermented normally and gave a normal loaf, with the characteristics of a freshly milled flour.

Mixing in oxygen or air for long periods resulted in a sticky dough which was also short, and bread of poor texture, low volume, greatly overmature. However, when mixing in oxygen was intermittent (no more than five minutes out of forty) loaves were normal. Oxidizing agents like calcium peroxide and potassium persulphate, added to a vacuum mixed dough reacted the same as an oxygen dough. Bromate, on the other hand, when present in amounts of 0.001 per cent and up, gave short doughs and bread of poor texture and low volume.

Digest from "Mixing Doughs in Vacuum and in the Presence of Various Gases," by Baker and Mize, *Cereal Chemistry*, 14, 721, 1937.

BEVERAGES

Apple Brandy Flavor Improved by Lactic Acid

IN AN INVESTIGATION of the relative merits of fresh and fermented apple juice as a source of brandy, tests were made with fresh pressed cider and with cider which had been fermented naturally and with pure yeast cultures. Brandy from the prefermented cider was distinctly superior in flavor, and in particular it was characterized by a fruity aroma which was lacking in the brandy made from fresh pressed cider. The tests also showed that *addition of a suitable small proportion of lactic acid* to the mash in preparing the prefermented cider had a favorable effect on the flavor of the finished brandy, an effect which may be related to the chemical similarity between lactic (hydroxypropionic) acid and the malic (hydroxysuccinic) acid which naturally occurs in apples. Use of pure yeast cultures in the prefermented mash gave better brandy than did natural fermentation. The results of the investigation clearly show the advantage of prefermentation in the commercial production of apple brandy.

Digest from "Comparative Tests on the Production of Fruit Brandy From Prefermented and Fresh Pressed Juice," by W. Zimmermann and K. Wöger, Zeitschrift für Spiritusindustrie 60, 161, 1937. (Published in Germany.)

Mashing Operation Shortened

EXTRACTION of maximum quantity of wort from a grain mash in the shortest length of time is claimed for the mashing method outlined in U.S. Patent No. 2,080,287 granted May 11, 1937 to Edmund Meyer, Ulm A. D., Germany.

Means for obtaining these results consist of spreading the malted grain over a circular area, dividing the grain bed into concentric zones or areas which progressively increase in number from the center of the area to permit easy and equal access of the extracting liquid to all parts of the grain bed, and draining the wort from equal areas of the grain bed along a plurality of individual lines each having a small pressure head.

The operations are carried out in a combination mash and drain tub equipped with a plurality of rotating arms carrying vertical knives and plows and horizontal knives with sickles to divide the grain bed into layers and concentric areas. Drain holes in each area vary in number and diameter to permit substantially uniform drainage.

CANNING

Whole Fruit Juices and Syrups

PREVIOUS METHODS of handling citrus fruits to obtain juices and syrups for beverage, confectionery, fruit ice, and conserve manufacture have left much to be desired.

These methods have been based on the pressing of the whole fruits or on the cutting of the fruits in halves for peeling, reaming or pressing out only the juices, extracting the oil from the rinds or peels by solvent action or pressing, and combining the extracted oils and juices.

Juices and syrups here-to-fore prepared by these methods have a milky appearance, bitter taste or an insipidness and lowered food value resulting from contact of the juice under pressure with the albedo and fibrous portions of the fruit, and loss of volatiles, vitamin content and similar constituents which contribute to the flavor, aroma, and food value of whole citrus fruits.

U.S. Patent No. 2,086,911 granted July 13, 1937, to Wallace Curtis Hill, Pomona, Calif., provides for the disruption of the oil sacs and juice cells by fine slicing or shredding with consequent freeing of the oils and juices which may be recovered with or without the whole fruit solids minus the albedo and fibrous membranes, with the oil and juice in stable suspension, and with normal vitamin and aromatic volatiles content.

Success of this method depends upon the speed and precision with which the slicing or shredding is done as well as upon the design of the machine.

DAIRY PRODUCTS

Cheese and Propionic Acid

USE OF PURE CULTURES of propionic acid bacteria in cheese making having become well established in Switzerland and the United States, a method for preparing the cultures is important. Experiments in Microbiological Laboratory of the Botanical Institute in Moscow have led to the following procedure: A lactate nutrient medium is inoculated with highly diluted ripe cheese, which will ordinarily be free from harmful organisms, such as *B. coli* and the butyric acid organism, because these are scarce in cheese and the chance of entry is small by such a high dilution. Every two months reinoculate by transfer into 100-150 cc. of medium. Prepare individual cultures for cheese vats by adding 2 per cent calcium carbonate to milk serum, sterilizing in glass, cooling, adding ½ per cent of the propionic acid culture and keeping at 30 deg. C. at least ten days or until turbidity appears. This culture is introduced into the cheese vat along with the lactic acid bacteria. The quantity to be used for inoculation is about 0.5 per cent of the prepared culture, calculated on the cheese batch. Lactate medium which is employed in this method contains 20 g. calcium lactate, 10 g. peptone, 5 g. sodium chloride and 2 g. dipotassium hydrogen phosphate in one liter of water. No precautions are necessary for exclusion of the lactic acid organism in making the inoculation from ripe cheese.

Digest from "Use of Propionic Acid Bacteria in Cheese Making," by A. F. Voitkevich and L. E. Erzikyan, *Mikrobiologiya* 6, 234, 1937. (Published in U.S.S.R.)

CONFECTIONERY AND CHOCOLATE

Adding Phosphatides to Chocolate

ACCORDING TO A GERMAN INVENTION (German Patent 645,286, granted May 25, 1937, to Hansa-Mühle Aktiengesellschaft, Hamburg, Germany), phosphatides, either of animal or vegetable origin, are successfully incorporated in chocolate confection by direct addition. Only a small proportion of phosphatide is needed to give a chocolate preparation the desired smooth consistency. Two different fractions from the phosphatide preparation may be employed, one insoluble in alcohol and the other slightly soluble, or mixtures of these two types of phosphatides may be used. The source may be brains and spinal cords of slaughtered animals, or a vegetable material such as soy bean lecithin. Among the recipes for use of phosphatides in chocolate confections, the following illustrates the process disclosed in the invention: A sweet chocolate (cocoa 41 parts, sugar 59 parts) is blended with cocoa butter and 0.4 part of a phosphatide (alcohol-insoluble, alcohol-soluble or a mixture of both fractions) from soy bean lecithin is added.

Concentrated Frozen Milk

TESTS show that a concentration of roughly three to one is best for preservation by freezing; also that the milk should be homogenized prior to concentrating and freezing to prevent separation of butter fat after thawing. The storage period of about twelve weeks seems to be the maximum possible, and beyond this indefinite period it is not always possible to reconstitute the frozen product to normal milk. The proteins of frozen milk are denatured (coagulated) after prolonged storage, but sometimes can be restored by heating to 150 to 160 deg. F.

Best temperature for defrosting seems to be about 120 deg. F. rather than room temperature or 50 deg. F.

Digest from "Observations on Concentrated Frozen Milk, by Doan and Featherman, Pennsylvania State College, a paper read before meeting of Eastern Division, *American Dairy Science Association*, Sept. 20, 1937.

(Turn to page 677)

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Milk Heater-Cooler

CREAMERY PACKAGE MANUFACTURING Co. exhibited for the first time at the Dairy Industries Exposition in New Orleans last month, a new design of "Full-Flo" plate type heater-cooler-regenerator for milk pasteurizing plants. This device can be used as a heater, a cooler, a regenerator, or as a combination of all three. As a heater, cooler, or regenerator, its capacity can be varied up to 40,000 lb. of milk per hour. When used as a combination, in a short-time pasteurizing system or in

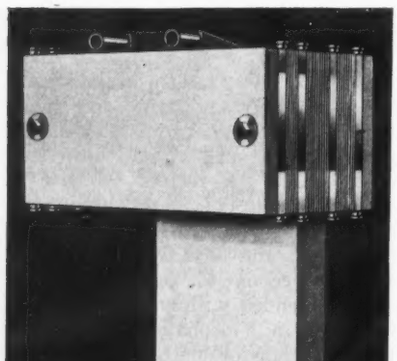


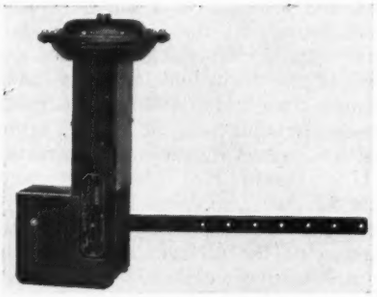
Plate type heater-cooler-regenerator for milk.

a holding pasteurizer system, its capacity is up to 30,000 lb. per hour. Advantages claimed include high efficiency, small floor space requirement, and ease of cleaning.

Liquid Level Control

J. G. RUSSELL Co., 103 Boston St., Boston, Mass., has developed a liquid level control which is said to indicate or maintain levels within a small fraction of an inch, and at any desired pressure, when used together with solenoid-operated or motor valves, motor-driven pumps, or other electrical equipment.

The device consists of a float, operating in a chamber, a control box and a switch. It has no wearing parts, nor any electrical switching or contacts within or without the float chamber.



Pneumatically operated lever motor for controls.

Lever Motor for Controls

TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y., has developed a pneumatically operated lever motor called the "Motosteel Evenaction." It is of all-steel welded construction. Advantages claimed include precision operation characteristics to insure a uniform relation between air pressure and lever travel; freedom from hysteresis; great power; and smooth action. A number of take-off holes are provided throughout the length of the lever, so that the force or travel of the motor may be adjusted. The power of either the up or down stroke can be increased or decreased by a spring adjusting nut. The lever action can be reversed by substituting another lever and transposing the fixed and movable pivots. Limit stops are provided for both up and down strokes.

These motors come in three sizes, in terms of the following damper areas that can be controlled: 25 sq.ft., 50 sq.ft., and 120 sq.ft. Operation may be by remote manual control, electropneumatic switch, or pneumatically operated control. The motor can also be operated in parallel with a diaphragm valve or other pneumatic equipment.

First Aid Kit for Burns

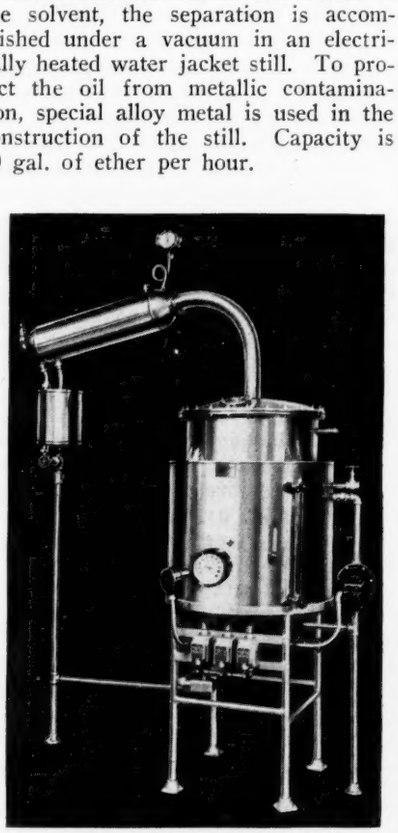
DAVIS EMERGENCY EQUIPMENT Co., 55 Van Dam St., New York, N. Y., is now supplying a first-aid kit designed for the emergency treatment of serious burns such as may occur in bakeries, canning plants and other food factories using steam, hot oil or fuel in cooking and heating processes.

This kit is furnished in bright red enamel and is conspicuously labelled "First Aid Kit for Burns." It contains twelve gauze compresses, twelve six-yard lengths of 4-in. bandage, six 5-oz. tubes of "Tannoid," and three packages of wooden applicators for applying the "Tannoid." The compresses can be opened up in progressively larger sizes, so that they can be used for covering large or small areas. The "Tannoid" is a jelly containing 5 per cent tannic acid, a recognized treatment for burns.

Solvent Recovery Still

BARNSTEAD STILL & STERILIZER Co., 130 Lanesville Terrace, Forest Hills, Mass., has developed a new still for use in recovering solvent used in treating edible oil. This still is particularly adapted for use in the manufacture of irradiated edible oils which are treated with ether before irradiation. The still separates the ether from the oil.

Because of the inflammable nature of the solvent, the separation is accomplished under a vacuum in an electrically heated water jacket still. To protect the oil from metallic contamination, special alloy metal is used in the construction of the still. Capacity is 10 gal. of ether per hour.



Electrically heated vacuum still for solvent recovery in edible oil processing.

"Flocontrol" Valves

HANCOCK VALVE DIVISION, Manning, Maxwell & Moore, Inc., Bridgeport, Conn., is making a redesigned valve of the "Flocontrol" type for use on steam-heated kettles, retorts, pasteurizers, washers and other process equipment, and for proportional blending of liquids. New features include superhard stainless steel seats and disks of 500 Brinnell hardness, which give added wear, and a body of the union bonnet type, in place of an inside screw bonnet, making the valve more readily disassembled.

Plug-In Instruments

AMMETERS AND VOLTMETERS and other instruments of detachable type, which have sockets that can be cut into the conduit run feeding a motor, or grouped in standard metal boxes to make a panel assembly, have been developed by Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

With sockets installed in all circuits leading to electrical loads, it is possible to use one set of instruments to determine consumption and performance characteristics of all. Also, the socket serves as a switchboard, eliminating all panels, wiring and mounting details.

Delivery Truck

DESIGNED PARTICULARLY FOR DELIVERY SERVICE in the baking, dairy and similar fields, White Motor Co., Cleveland, Ohio, has announced its 1938 Model 800 "Merchandor." This is a short wheelbase, engine-under-floor delivery truck with 350 cu.ft. of body space. With a wheelbase of 102 in., and a wide, 63-in. tread front axle, this truck will make a complete turn in a circle of 36 ft. diameter. Overall length is 17 ft. Power is supplied by a 6-cylinder engine of 205 cu.in. displacement.

Colored Stapling Wire

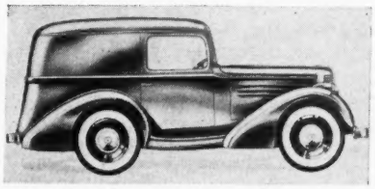
STAPLING WIRE of almost any color is now being made to order by Acme Steel Co., Chicago, Ill. It is called "Colorstitch," and is for use in "dressing up" shipping containers. This colored wire is made in all standard stapling wire sizes, in lots of 500 lb. or more. The material is rust-resisting. Color card can be obtained from the makers.

Heavy Duty Tires

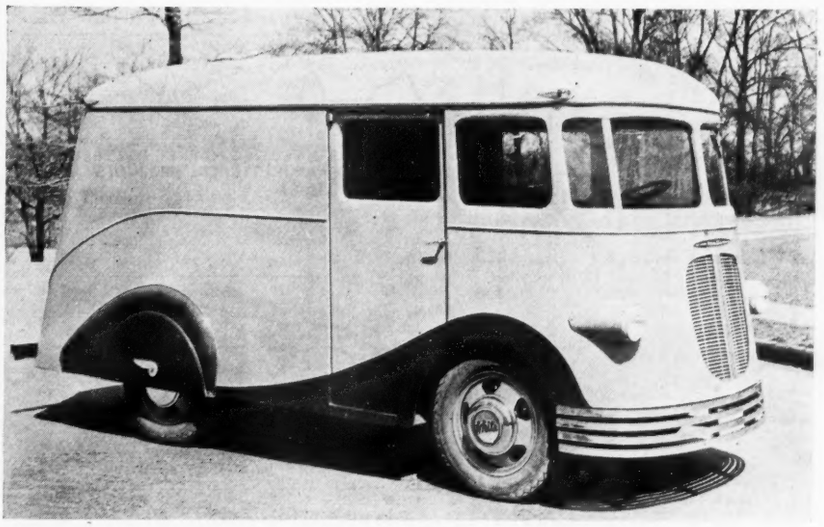
B. F. GOODRICH Co., Akron, Ohio, is making a line of heavy duty truck tires designed especially for ½ and ¾ ton vehicles. Sizes available are 6.00-16; 6.50-16; 7.00-16 and 7.50-16. All are made in 6-ply, while the 7.50-16 is also available in 8-ply. The purpose of the new line is to provide heavy duty truck tires for light trucks formerly served by passenger vehicle tires.

Small Delivery

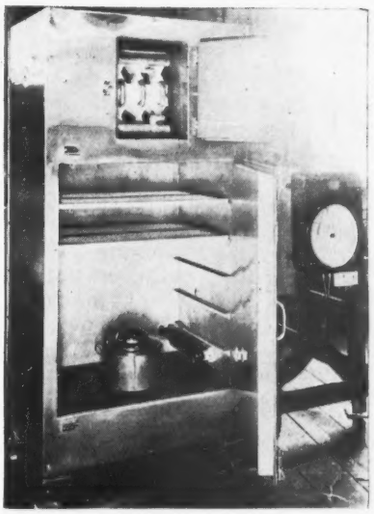
AMERICAN BANTAM CAR Co., Butler, Pa., (formerly Austin Car Co.) has just introduced the "Bantam" delivery truck, in ¼-ton panel and pick-up body models. This truck, equipped with a 20-hp., four-cylinder engine, is the smallest delivery truck available. Overall length is 120 in. Extreme economy of performance (up to 60 miles per gallon) is claimed, with top speed of 60 m.p.h. These trucks should find a niche in the food field for light delivery and special delivery service.



"Bantam 60" panel body delivery truck.



New White "Merchandor" delivery truck.



Moist air cabinet for food laboratories.

Moist Air Cabinet

FOR USE IN FOOD LABORATORIES, Despatch Oven Co., 622 Ninth St., S. E., Minneapolis, Minn., has designed a new moist air cabinet. It is for use in making such tests as staling, aging, and air leakage through containers.

This oven is constructed of stainless steel and insulated with rock wool between the double walls. An automatically controlled electric heating system, mounted in the lower portion, has forced air circulation and recirculation. There is also an automatically controlled humidifying system capable of maintaining the humidity inside the cabinet within close limits, and a Frigidaire cooling system.

Particle Size Analyzer

AMERICAN INSTRUMENT Co., Silver Spring, Md., has introduced the "Roller" particle size analyzer. This device makes analyses of particle size distribution in dry, powdered materials. With it, any number of size fractions may be obtained, with size limits as close as desired, the smallest fraction conveniently secured being 0 to 5, or 0 to 3, microns, depending upon the density of the material. Percentage weight of different fractions is duplicable to 0.5 per cent.

Trailer Body

FRUEHAUF TRAILER Co., Detroit, has developed a new, easy-to-service construction for trailer bodies in its Type F. This body has side panels that can be removed individually, and "snap-on" moldings. The side panels are backed with plywood, to increase strength and eliminate waviness. Beneath the moldings are new "lapping" type weatherproof seams which are easily separated for service purposes. Tail gates, doors, uprights, crossbars, roof bows and other parts can be furnished as regular service parts.

BUSINESS TRENDS

Commodities Fall

LARGE CROP YIELDS, in fatal combination with a skidding stock market, foreign war scares, failure of inflation to materialize, and domestic business uncertainty, combined to bring the prices of commodities down sharply during the first three weeks of October.

While this price movement has caused considerable surprise, it need not have done so. Aside from the rapid decline in stocks, all the other factors were more or less visible as long ago as last April, and, as the crop season advanced, the part that would be played by bumper harvests became more and more evident. With inflation failing to come, and with ample supplies of all food commodities except meat animals, the price level became artificial and the downward readjustment could not be escaped.

The question now arises as to when the low point will be reached. On Oct. 9, the *N. Y. Journal of Commerce* Index of Commodity Prices reached an apparent low of 85.5 per cent of the 1927-1929 base. By Oct. 16 it had climbed to 86.1 per cent. However, this move was out of line with both the trend of stock market prices and the level of industrial production, both of which continued down. In contrast to the movement of the *Journal of Commerce* index, Fisher's index number of average commodity prices stood at 89.5 on Oct. 16 (1926 = 100), compared to 89.8 on Oct. 9. Four weeks before (Sept. 18) this index stood at 92.4, and it was at a peak of 94.7 in the first week of April.

One factor that should tend to send food commodity prices upward during the next few months is the very strong probability that the special session of Congress, called for Nov. 15, will enact some sort of crop restrictions. This upward tendency will be combatted, however, by the definite consumer resistance to higher food prices, so evident in the last two months.

Construction News

	Pending (thousands)	Awarded October (thousands)	Total Awarded 1937 (thousands)
Bakery	$140	$170	$1,409
Beverages	140	445	8,451
Canning and Preserving	40	144	1,584
Confectionery	.....	.....	40
Grain Mill Products	40	.....	785
Ice Manufactured	40	.....	3,486
Meats and Meat Products	....	40	1,480
Milk Products	280	80	5,188
Miscellaneous	465	187	10,139
	$1,145	$1,066	$32,562

Consumption of Fats and Oils

FIGURES RECENTLY COLLECTED from government sources by the Bureau of Raw Materials for American Vegetable Oils and Fats Industries show the distribution of fats and oils among their major uses in the United States in 1936. According to this compilation, 67.1 per cent of all fats and oils consumed is used as food, 17.5 per cent in the manufacture of soap, 8.4 per cent as drying oils, and 7.0 per cent for miscellaneous manufactured products.

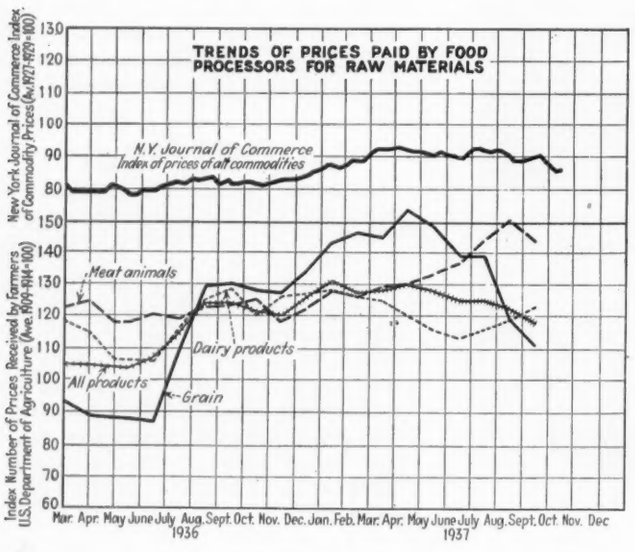
Of the fats and oils used as food, 87.6 per cent is of domestic origin and 12.4 per cent is imported. Butter constitutes about 34.5 per cent of these edible fats and oils; lard is about 24.0 per cent; oleo and stearine, 4.0 per cent; soybean oil, 3.5 per cent; corn oil, 1.5 per cent; peanut oil, 2.0 per cent; fish oil, 1.0 per cent; cottonseed oil, 19.0 per cent, coconut oil, 4.5 per cent; palm oil, 3 per cent; olive oil, 1 per cent; sesame oil, 1 per cent; and 1.0 per cent is made up of miscellaneous products.

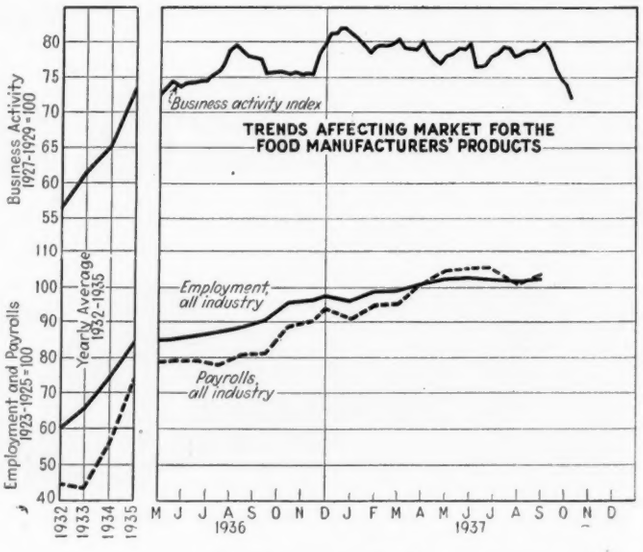
Fats and Oils Situation

COTTONSEED OIL will dominate the situation in the edible fats and oils field for the next ten or twelve months. With every indication pointing to a lower production of lard and other animal fats in the 1937-38 crop year, and with no prospect of any great increase in the domestic butter supply, the vegetable oils must be depended upon to balance the oils and fats supply situation.

That this will be done is more than likely, and that without any increase in vegetable oil imports. The 17½ million bale cotton crop is expected to yield 33 per cent more cottonseed oil than was available in 1936-37. Soybean oil yield is estimated to 15 to 20 per cent higher this year than last. And peanut and corn oils will show considerable gain.

Thus it would seem that, for the current year, and in spite of the steady increase in consumption (estimated to be close to 10 billion lb. of fats and oils for all purposes in 1937) supplies will be ample. The only serious doubt that exists concerns the supply of coconut oil, for which certain definite needs exist. This oil is all imported, and the availability of supplies rests upon the availability of bottoms from Manila. Far Eastern war clouds raise some ques-


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
N.Y. Journal of Commerce Index of prices of all commodities
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave. 1909-1914=100)
Meat animals
Dairy products
All products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec
1936
1937


Business Activity 1927-1929=100
Employment and Payrolls 1923-1925=100
Yearly Average 1932-1935
Business activity index
TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Employment, all industry
Payrolls, all industry
1932 1933 1934 1935
M J J A S O N D J F M A M J J A S O N D
1936
1937

Business Off

Contrary to expectations in mid-September, business did not pick up after the Labor Day pause, but instead unexpectedly slid downhill. Led by a tumbling stock market, with help from abounding domestic crops and foreign war scares, business crashed through the levels of 1936. In the four weeks ending Oct. 16, the *Business Week* index of business activity registered a decline of 9.21 per cent.

Insiders now credit this decline mostly to inventory fears. Swollen inventories built up in last spring's inflation scare did not move fast enough to suit their holders, so buying stopped. Another month or two should see this situation corrected, with prospects for renewed generous buying at that time. Meanwhile, high auto production and Christmas retail sales should help to bottom the decline.

Wholesale prices of all commodities, according to the U. S. Department of Labor index, fell 1.84 per cent in the five weeks ending Oct. 16. In the same period this index for farm commodities fell 4.97 per cent, while for foods it fell 1.38 per cent. The *N. Y. Journal of Commerce* weighted commodity price indexes, for the five weeks from Sept. 18 to Oct. 23, all declined, the general index dropping 5.75 per cent, the grain index falling 6.34 per cent, and the food index falling 9.55.

tion as to this shipping situation.

Supply of edible oils and fats in 1938-39 is another matter and will bear watching. By that time the domestic animal oil and fat supply should improve, but the likelihood of crop restrictions in 1938, particularly as to cotton, casts doubt on the vegetable oil supply a year hence. Add to that the war in China and the threats of war in Europe, which may cause increased demand from that quarter, and it is apparent that future supply conditions are not to be viewed with undue optimism.

Food Imports and Exports

BOTH IMPORTS AND EXPORTS of food products have increased greatly in recent months. Figures for August, the last full month available, show that food exports in that month were valued at $27,329,000, an increase of 39 per cent over the $19,650,000 exports of August, 1936.

In the same months, imports of foods were valued at $66,944,000, up 18 per cent from the $56,780,000 recorded for the same month of 1936.

Exports of food for 1937 had hardly begun in August, as harvests were then just starting for most important farm products except wheat. It is expected that both the quantity exported, and the increase over 1936 exports (when the drought held crops at low levels), will be much greater in the remaining months of the year.

Candy Sales Up Again

SALES OF CONFECTIONERY and competitive chocolate products in August, 1937, as reported by the U.S. Department of Commerce, were $16,202,746. This compares to sales of $15,352,355 in August, 1936, an increase of 5.5 per cent. Sales for the May-August summer season this year were $61,-796,981, up 10.1 per cent from the sales of $56,129,456 recorded in the same months last year.

August sales this year did not, however, show the usual seasonal increase, as they were up only 20 per cent over the low point of July, whereas the usual seasonal increase for July to August is around 30 per cent.

INDICATORS

FLOUR MILLED in September, 1937, was 5,873,259 bbl. for mills annually accounting for 65 per cent of U. S. production, according to General Mills, Inc. This compares to 5,572,076 bbl. for the same mills in September, 1936.

FISHERY PRODUCTS in cold storage in the United States on Sept. 15 were reported at 69,322,000 lb. by the Bureau of Fisheries. This compares to 84,696,000 lb. on the same date of 1936, and a five-year average of 67,633,000 lb.

GRAPEFRUIT CANNED in the year ending Oct. 1 is reported by the National Canners Association as 4,209,875 cases, all sizes.

GRAPEFRUIT JUICE is now canned in greater quantity than grapefruit. The National Canners Association reports the pack for the year ending Oct. 1 as 6,016,240 cases, all sizes.

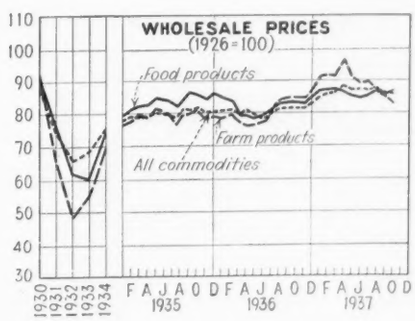
CLING PEACH PACK in California this year is estimated at 12,235,000 cases, the largest output since 1930.

PEAS CANNED in 1937, final report of the National Canners Association, totaled 23,376,056 cases, compared to 16,178,001 cases in 1936, and 23,762, 324 cases in 1935.

TURKEYS ON HAND in September were reported by the Bureau of Agricultural Economics to number 10 per cent fewer than in the same month a year ago.

HOP YIELD in the U. S. for 1937 is expected to total 33,000,000 lb., acording to the United Brewers Industrial Foundation.

WEEKLY FOOD INDEX of Dun & Bradstreet, Inc., was $2.82 on Oct. 14, down 3.4 per cent in three weeks. On the comparable date in 1936 this index was $2.76.



Prices received by farmers are from the U. S Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board.

Trade in Foodstuffs With Japan and China Forms Negligible Part of Total U.S. Foreign Trade

Product	Exports to Japan Jan. to May, 1936	Exports to Japan Jan. to May, 1937	Exports to China Jan. to May, 1936	Exports to China Jan. to May, 1937
Milk, condensed and evaporated	$2,000	$3,000	.....	.....
Flour	.....	.....	$84,000	$160,000
	Imports from Japan		**Imports from China**	
Tuna fish, canned	$519,000	$1,189,000	.....	.....
Crabmeat	946,000	1,093,000	.....	.....
Beans, dried	10,000	438,000	.....	.....
Tea	499,023	973,000	83,000	284,000
Edible oils	.....	.....	1,343,000	583,000
Oil seeds	.....	.....	2,457,000	223,000
Sausage casings	.....	.....	503,000	1,092,000
Total Imports	$1,974,000	$3,693,000	$4,386,000	$2,182,000

Keeping Up WITH THE FIELD

Action Expected on Wages and Hours and Crop Control—Joker in Food Bill—Ice Cream Men and Master Brewers Hold Meetings—Margarine Industry Prepares Code

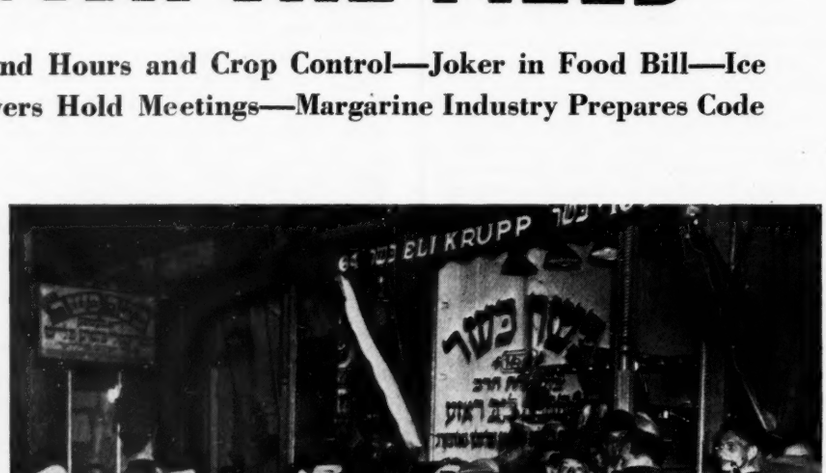
More Laws in Prospect

AT LEAST two pieces of legislation of fundamental importance to food processors and distributors will come up for enactment shortly after Congress convenes in special session on Nov. 15. A wages-and-hours law and crop-control legislation, including a processing tax on foods, are two of the things that President Roosevelt expects his lawmakers to put onto the statute books before they go home for the Holidays.

One man's guess is as good as another's on the President's chances of getting the desired legislation passed.

On the matter of wage-and-hour regulation, Southern industries, led by the lumber group, are still very much in a fighting mood. They intend to accept no compromise and are out to again beat this type of legislation.

Favoring action on crop-control legislation is the fact that at farm meetings held through the country in recent months, the agrarians are reported to have voiced strong approval when the question of Federal regulation of production was brought up.



BUTCHERS PROTEST PRICES

Blaming the economically enforced high price of meat on the packers, 5,000 kosher butchers in New York City closed their shops in protest on Oct. 2, and stores remaining open were picketed. Crusading consumers, city officials and even Secretary Wallace took a hand in the situation. The shops reopened after a few days, but the strike resulted in a proposal for licensing packers, wholesalers and retailers in New York and compulsory quality grading. The packers, it seems, were "sold down the river" by their dealers.

Danger in Food Bill

WITH the possibility existing that action will be taken on the food and drug bill soon, some concern is felt in industry as to the meaning of Section 401 of Committee Print 3 of S 5. This measure was drawn up and approved by the subcommittee of the House Committee on Interstate and Foreign Commerce just before adjournment of Congress. It is felt that as written, Section 401 will permit the Secretary of Agriculture to require grade labeling, because it states that: "Whenever in the judgment of the Secretary such action will promote honesty and fair dealing in the interest of consumers, he shall promulgate regulations fixing and establishing for any food or class of food a reasonable definition and standard of identity, a reasonable standard of quality, and/or reasonable standards of fill of container."

It has been suggested that this sounds like a consumers' bid for grades on labels. Further, this bill introduces the phrase "any class of food" into the section on standards of quality, and there is uncertainty as to how this will be interpreted by the Secretary of Agriculture in event the bill becomes law.

Process Exposition

MORE THAN 250 companies have already engaged space in which to exhibit during the week of December 6 the latest creations in equipment and supplies for the process industries. And at this Exposition of Chemical Industries, at Grand Central Palace, New York, food manufacturers and technologists will see what is available in efficient machinery for doing a range of unit operations and processes as broad in scope as the applications in industry.

Package Show

LATEST developments in machinery, equipment, supplies and services vital to the art and science of packaging will be exhibited by some 75 companies at the Eighth Packaging Exposition. Sponsored by American Management Association, the exposition will be held this year in Chicago, March 22-25. As in previous years, it will be concurrent with a conference on packaging, packing and shipping, at which national authorities will discuss outstanding problems and developments in these fields. A special feature of the exposition will be the showing of all entries in the competition for the Seventh Irwin D. Wolf Awards.

Brewers Discuss Problems

WITH AN ALL-TIME-HIGH registration, Master Brewers' Association of America met in its 34th annual convention at Milwaukee, Oct. 4-8. In conjunction with the convention, the association held its first brewing materials and equipment exposition.

In the technical as well as general sessions, the convention evidenced the desire of the association to put forward the best foot of the industry. President Herman A. Rosenbusch reminded members that: 1. The Ameri-

can people will have their beer, legally or illegally. 2. The majority of people favor moderation in the consumption of alcoholic beverages. 3. The public favor will be with the brewing industry as long as wholesome beer can be obtained legally and without violation of any code of morals or of temperance.

Prof. R. H. Hopkins, head of the British School of Malting and Brewing, University of Birmingham, England, in his review, "Some Recent Advances in Brewing Science and Technology," discussed methods by which beer is freed of haze or turbidity through preventive treatment.

G. J. Patitz, supervising engineer, Standard Brands, Inc., New York, emphasized the importance of having the engineer and the master brewer work together as a team instead of vieing with each other in assertion of authority.

H. S. Ellington, Hurley and Ellington, Detroit, highlighted trends in brewery design to show that the brewing industry is gradually availing itself of the latest in equipment as well as compact and efficient plant design and layout. He identified the modern brewery as primarily a food-manufacturing plant.

Not alone did the more than 5,000 total registration give proof of the improving conditions in the brewing industry. A new record was set by the 255 exhibitors of materials and equipment in the exposition. For the first time, dairy-type leaf coolers for chilling hot wort were exhibited. They were built of stainless steel. A continuous hop strainer, a unit for removing air from head space in filled bottles, can-filling and sealing machines, auto trucks to carry a 15-ft. brewers' stake body on a 166-in. wheel base, glass-lined yeast-culture units, dust- heat- and oil-free air compressors, plate filters with fixed center piece, direct-draw-beer-keg cooling units and bottle casers were among the equipment given a showing at this exposition for the first time.

The master brewers elected J. W. Russert, Blatz Brewing Co., Milwaukee, president for the next year. Other officers chosen include George B. Sipple, Burger Brewing Co., Cincinnati, first vice-president; Lewis Walther, Falstaff Brewing Co., St. Louis, second vice-president; Philip Berkes, Adam Scheidt Brewing Co., Northtown, Pa., third vice-president; Edward A. Geisler, U. S. Brewing Corp., Chicago, treasurer; and Henry O. Sturm, Standard Brewing Co., Rochester, N. Y., secretary.

Ice Cream Convention

ANSWERS to problems in labor relations, economics, salesmanship and other phases of business were given by authorities addressing the convention of International Association of Ice Cream Manufacturers at Dallas, Texas, October 18-20. And quite a crowd of manufacturers was on hand to take advantage of the program, the registration approaching the thousand mark at the end of the second day.

In an address, "Our Industry," Madison H. Lewis, president, reported that the past year has seen a tremendous increase in the demand for novelty ice cream products. He also warned that because of its seasonal nature, the industry faces a problem if the wage-and-hour legislation is put through Congress.

Many employers take labor leaders too seriously and yet do not take their employees seriously enough. That was a point made by Whiting Williams, Cleveland labor relations authority. He urged employers to avoid labor difficulties by making personal contact with the employees and by showing appreciation of the worker and respect for his job.

Retailers are hungry for new merchandising ideas and methods, and manufacturers should cooperate in providing them, George Hennerich, manager of the association's merchandising institute, told the manufacturers. Salesmen should be capable of advising dealers, and properly trained salesmen will sell from 25 to 40 per cent more than those who are untrained, according to Mr. Hennerich.

There are two important consumer trends affecting the industry, in the opinion of Milton Hult, president of National Dairy Council. One is increasing knowledge of nutrition, and the other is a growing tendency for women's groups to demand of business what they want. To sell women today, Mr. Hult said, it is necessary to give them reasons why they should eat more ice cream.

The three essentials of showmanship are to attract attention, make an emotional appeal and dramatize the selling idea. That is the opinion expressed by Zenn Kaulman, coauthor of "Showmanship in Business." Don't tell people how good you make your goods; tell them how good your goods make them," he said.

This meeting of the industry was held in conjunction with the convention of International Association of Milk Dealers in Dallas and the Dairy Industries Exposition in New Orleans.

The association reelected all its officers.

Prepare Fair-trade Code

IN A MOVE to clean its house of undesirable trade practices, the margarine manufacturing industry is drawing up a code covering the business ethics of its members. At Chicago on October 13 a hearing on the evils in the industry was held under the auspices of the Federal Trade Commission, there being in attendance members of both the Institute of Margarine Manufacturers and National Association of Margarine Manufacturers. Twenty-two rules for trade conduct have been proposed, these covering selling below cost, discriminatory rebates, refunds, discounts, credits and other allowances; false and misleading branding; the use of foreign oils, such as whale oil; and the luring away of other manufacturers' employees.

New Drying Process

RAPID DEHYDRATION of vegetables is made possible by first exposing the sliced vegetable to vapors of certain chemicals. This conclusion is reached by the Bureau of Chemistry and Soils, which proposes to secure a public-

THEY BREW THE BEER

In this group are the leading master brewers of the United States. They assembled in Milwaukee October 4-8 for the annual convention of Master Brewers Association of America.

service patent covering the newly developed process. Vapors found effective are toluol, chloroform, ether, benzol, petroleum ether, carbon tetrachloride, sulphur dioxide and chlorine. After exposure to vapor, pressing the vegetables permits elimination of from 50 to 85 per cent of the weight and subsequent rapid thorough drying at low temperature.

It is hoped that the process will make more economical the drying for storage of various fleshy plant materials like potatoes, carrots and beets. Application of the process is expected to prepare this type of material so that subsequent industrial processing may be carried out during a longer season.

CONCENTRATES

• Food manufacturers will go no further than setting minimum prices if and when they put their products under State fair-trade laws, according to Paul S. Willis, president of AGMA . . . Federal Surplus Commodities Corp. has announced plans to purchase surplus storage or fresh shell eggs, dry green peas, dry edible beans and apples. The government also will buy cottonseed oil.

• *Imports of canned ham from Poland, which have been troubling Atlantic Coast packers, are expected to fall off because grain and hog supplies are short over there and prices are up . . . Importation and interstate shipment from Puerto Rico and Hawaii of frozen fruits, other than those which may be entered in the fresh state, have been authorized by the government . . . Four years ago, the first grapefruit-juice canneries went into operation in Texas to utilize methods developed by the Bureau of Chemistry and Soils. During the 1936-37 season, 2,563,000 boxes of the fruit were processed in 27 plants.*

•Women in industry suffer more accidents as a result of falls than from any other working hazard, in the opinion of Ellen D. McKeon, American Mutual Liability Insurance Co. . . . New ways to utilize wheat flour and bread will be developed in a laboratory kitchen recently constructed by Wheat Flour Institute, Chicago, and recipes will be tested for members . . . American Association of Creamery Butter Manufacturers, organized in 1908, has simplified its name, making it American Butter Institute.

• *Eight million pounds of shrimp is expected to be quick-frozen annually at the State Docks, Mobile, Ala., where new freezing equipment has been installed . . . Amendments to the Food and Drugs Act, pertaining to the labeling of substandard canned foods and to standards of fill, became effective last month. The regulations were issued July 12 as Service and Regulatory Announcements, Food and Drug No. 4 (Fourth Revision) . . . "What's new in the creamery industry" is the theme of a symposium on butter to be held at the University of Minnesota, Nov. 16-19.*

CONVENTIONS

NOVEMBER

8–10—Associated Coffee Industries of America, Roosevelt Hotel, New Orleans.

14–17—New England Bakers Association, fall meeting and exhibit, Statler Hotel, Boston.

15–19—American Bottlers of Carbonated Beverages, convention and exhibit, Municipal Auditorium, New Orleans.

30–Dec. 1—American Association of Creamery Butter Manufacturers, Palmer House, Chicago.

DECEMBER

2– 3—Tri-State Packers Association, Benjamin Franklin Hotel, Philadelphia.

6–11—Exposition of Chemical Industries, Grand Central Palace, New York.

Mid-October

CAPITAL VIEWS

NEW COSTS—All manufacturing, including the food industries, may be confronted by new or greater costs under each of the major items of legislation proposed for the next session of Congress. Outstanding in the legislative program are six proposed measures: wage-and-hour standards, new farm-control law, seven regional "TVA" planning agencies, government reorganization, a new tax law and neutrality revision. Even such items as a food and drug law, stream-pollution legislation and other measures of direct importance to food manufacturers appear less significant as affecting future costs than do the six first-named New Deal proposals, general to all business.

FOREIGN TRADE—The proposed reciprocal-trade treaty with Britain will probably be negotiated shortly. It is expected to effect many changes in present industrial tariffs. It may significantly modify present rates of duty on both raw materials and processed foods. Such new rates may prove more important to the international food business than are the direct embargoes which Japan has placed as a part of its effort to conserve national funds for its Chinese expedition. As far as American food enterprises are concerned, the principal products prohibited import into Japan are canned fruit and dried milk. But Washington expects that the initial list will be amplified as full effect is given the new policy of Nippon.

DISCRIMINATION DEFINED — In its Robinson-Patman case prosecuting Standard Brands, the Federal Trade Commission has filed a brief in support of the complaint which charges discrimination under this act. Two very significant statements of counsel are included: "There may be an injury to competition due to discriminatory prices, even though the effect of such prices may not be to substantially lessen it, or tend toward a monopoly or destroy or prevent competition."—"Where the effect of discriminatory prices may be to give the person receiving such prices an advantage over his competitors in the competitive struggle, this justifies the Commission in holding that there may be an injury to competition."

TWO LAND POLICIES—While the Department of Agriculture vainly struggles to control the production of American agriculture within usable and marketable limits, the voice of the Commissioner of Reclamation was raised in an address of mid-October saying: "There has never been too much land under cultivation in these Western states. There has always been a crying need for more . . . Irrigation is essential . . . These Western irrigated lands do not add to surpluses . . ." Food manufacturers can expect that this policy of more land by reclamation will be followed, as it conforms with the President's personal desire. A new geography of raw food materials is thus gradually developed with production centers in the Far West.

NEW LICENSE LAW—Shall trade associations be licensed? This is a question raised by a group of Administration advisers who would like to make the Federal Trade Commission a supervisor of the affairs of those societies, institutes and associations by which business enterprises cooperate. The idea is born in the charge that these trade bodies afford too convenient a chance for illegitimate conspiracies regarding prices and other trade restraints. No law requiring such license is expected next winter. But the significance of the trend of Washington thinking, reflected in this proposal, is one that business men have noted with concern.

A Farmer's Bonus

(*Continued from page 627*)

by maintaining higher prices at the farm, which means higher prices at the processing plant, regardless of the processing tax. If we knew the answer to all this we would print it in big bold-face type, perhaps in red ink. At the moment we—and, we fear, everybody else—can merely state the problem as a difficult one, and costly in prospect.

MEN, JOBS *and* COMPANIES

Industry

» ARMOUR & Co., recently opened a new plant at Rochester, N. Y. The company has moved its district administrative offices from Roanoke, Va., to Huntington, W. Va., and it plans an $18,000 addition at Asheville, N. C.

» MRS. BAIRD'S BAKERY, Fort Worth, Texas, will put up a two-story factory with a floor space of 54,000 sq.ft. The new plant will produce bread, the present one being retained for cake.

» CENTRAL SOYA Co., Decatur, Ind., is making an addition to its processing plant and is erecting ten concrete silos with a capacity of 500,000 bu.

» EASTERN STATES FARMERS EXCHANGE, Buffalo, suffered damages of $5,000 in a dust explosion on Oct. 8. Two employees were slightly injured.

» FALLS CITY BREWING Co., Louisville, is completing a $175,000 remodeling program.

» GENERAL SEAFOODS CORP. has launched three new diesel-powered trawlers which will bring in fish for quick-freezing in Boston. With a speed of 12.4 knots, the boats are expected to reduce from eleven to nine days the average length of a fishing trip. Each boat can carry a quarter of a million pounds of fish.

» GRIESEDIECK BROS. BREWERY Co., St. Louis, is putting up a two-story brick building which will house a racking room and wash house.

» GOEBEL BREWING Co. has opened a $100,000 storage and shipping warehouse at Detroit. A conveyor system serves all floors and connects the warehouse with other buildings and the loading docks.

» HERSHEY CREAMERY Co. opened on October 15 a new plant at Wolf Lake, Pa., which is equipped to handle more than 100,000,000 lb. of milk annually. The new factory is one of the most modern of its type in the country.

» GREAT WESTERN SUGAR Co., Denver, has spent $200,000 this year in improving facilities for moving the sugar beet crop. Fifteen new piling machines and 39 new truck-type scales have been put into operation.

» INDEPENDENT MILWAUKEE BREWERY, Milwaukee, contemplates the erection of a large addition to its plant.

ARTHUR W. MILBURN

For almost 20 years president of Borden Co., New York, he died of pneumonia at Baden-Baden, Germany, Oct. 11. He was 63 and had been an outstanding leader in the dairy industry for many years.

» INTERSTATE BAKERIES CORP. is planning to merge with its subsidiaries, Schulze Baking Co., operating in the Midwest, and Western Bakeries Corp., Ltd., operating on the West Coast. Completion of the merger under the name of the Interstate company will form the fifth largest unit in the baking industry.

» KELLOGG Co. of Great Britain is constructing a $5,000,000 plant near Manchester. To be completed next February, the plant will supply England and continental Europe.

» KRAFT-PHENIX CHEESE CORP. plans to erect a $100,000 building at Buffalo, N. Y.

» MEAD JOHNSON & Co., Evansville, Ind., is expanding its plant to treble the output of precooked baby cereal.

» MICHIGAN BAKERIES, INC., Grand Rapids, Mich., has erected a new "daylight" addition to its plant, installed new loading facilities and enlarged the shipping room, tripling the amount of floor space. New equipment installed included a traveling-tray type oven with a 2,500-loaf per hour capacity. The entire plant is air conditioned.

» MICHIGAN SUGAR Co., has completed a $92,500 expansion program at its Carrollton (Mich.) plant.

» MODERN FOODS, LTD., Kelowna, B. C., has constructed a dehydrator and vinegar plant at a cost of $36,000.

» MOORE MILLING Co., Salem, Va., is rebuilding the plant which recently was destroyed by fire at a loss of $120,000, and has leased the Strickler flour mills, Harrisonburg, Va., until its factory is reconstructed.

» PEERLESS CORP., Cleveland, which operates Brewing Corp. of America, will spend about $550,000 on plant expansion to increase the capacity to 650,000 bbl. annually.

» PHOENIX BREWING CORP. has taken over the plant of Lieber Brewing Co., Indianapolis.

» RALSTON-PURINA Co., St. Louis, has distributed among its employees a bonus of $200,000. The company also paid an extra dividend of 37½ cents a share on common stock.

» SAMBO DAIRY PRODUCTS, INC., Brooklyn, N. Y., has purchased the plant of 4 Thirst Co., Metuchen, N. J. The plant will be used for bottling chocolate milk.

» STRATTON GRAIN Co., Milwaukee, has taken over the Union National Mill, Springfield, Ohio.

» TEXAS SEA FOODS, INC., will spend $100,000 in the construction of a quick-freezing plant at Corpus Christi. Seafoods, vegetables and fruits will be processed.

» WILSON PACKING Co., Jackson, Mich., has been absorbed by H. W. Madison Co., Cleveland.

» WISCONSIN MALTING Co. is erecting at Manitowoc a silo addition with a 500,000-bu. capacity.

Personnel

» W. H. BOWSER, Sisterville, has been chosen president by West Virginia Butter Manufacturing Association.

» LESLIE A. CLARK, for seventeen years associated with the produce department of Armour & Co., in Portland, Maine, has resigned to go into the grocery and restaurant business.

» DR. SUSIE E. DOEBBLING, who has been doing work on enzymes at Columbia University, has gone with Takamine Laboratory, Inc., Clifton, N. J.

» D. D. FENNELL, consulting engineer of Chicago, has been elected president of National Safety Council, succeeding Dr. C. H. Watson.

» WALTER B. FREIHOFER is again associated with Chas. Freihofer Baking Co., Inc., Indianapolis, having been named general manager.

» JOHN R. GIBBONS has succeeded J. M. Muir as superintendent of the Denver plant of Armour & Co. He formerly was superintendent of the pork-cutting department at Chicago and more recently traveling pork superintendent in the general superintendent's office.

» HOWARD W. HAGGARD, associate professor of applied physiology, Sheffield Scientific School, Yale University, has been retained by United Brewers Industrial Foundation, New York, as consultant on the physiological aspects of beer.

» DR. PHILIP L. HARRIS has resigned as research biochemist in the research laboratories of United Fruit Co. to become instructor in the department of chemistry and research associate in the food research laboratory of the Medical College of South Carolina, Charleston.

» DR. U. P. HEDRICK will resign in January as director of the New York State Agricultural Experiment Station, Geneva. He became director of the station in 1928.

» J. F. JESSE, Dodgeville, heads up Wisconsin Buttermakers Association for the coming year.

» L. H. MCLAREN, for nine years chief chemist and head of the bakery-service department of Shellabarger Mills, Salina, Kan., is now production manager of New England Bakery, Pawtucket, R I., it is reported.

» KENNETH N. RIDER has been named secretary-treasurer of Indiana Canners Association to succeed the late J. J. Rogers.

» HOWARD SCHAMEL, East Concord, N. Y., is the new president of Mutual Millers & Feed Dealers Association, succeeding Lionel True.

» WILLARD L. SIMMONS, Breyer Ice Cream Co., Philadelphia, has been re-elected president of the Association of Ice Cream Manufacturers of Pennsylvania and New Jersey.

» HOSEA S. SPARKS has resigned as purchasing director for General Mills, Inc., Minneapolis. He has been in the milling business 42 years.

» ALEXANDER R. TOLLAND, Boston, succeeds Dr. John G. Hardenbergh as president of International Association of Milk Sanitarians.

» JOHN WIRTH, Louisville, heads up Kentucky Master Bakers Association.

» STANLEY C. WOLOS has become superintendent of Speck Baking Co., Cleveland.

Deaths

» JOHN C. ABEL, 74, former manager of Pillsbury Flour Mills, in Buffalo, and vice-president of Fairchild Milling Co., Cleveland, recently.

» STEPHEN R. BEHAN, 61, retired member of the meat packing firm of Behan Bros., Schenectady, N. Y., Sept. 18.

» WILLIAM J. BARR, 47, president of Cameron & Barr Baking Co. and former president of Southern Bakers Association, Oct. 6, at Chattanooga.

» EARL A. COX, 56, former president of Cox Baking Co., Inc., Jamaica, N. Y.,

"Done to a Brown"

in ovens equipped with the Industrial Carburetors. Shredded Ralston, the favorite breakfast food of millions, is toasted in both traveling and rotary type ovens in the Shredded Ralston plant at Battle Creek. The Industrial Carburetor has been adopted throughout. Facts and figures show Kemp saves money for Ralston.

We will gladly make a survey of *your* situation and estimate the improvement and saving which can be effected.

Write the **C. M. Kemp Manufacturing Company, 405 East Oliver St., Baltimore, Maryland.**

KEMP of BALTIMORE

and head of New York State Bakers Association from 1929 to 1933, Sept. 27.

» EDWARD B. FITTS, 67, professor of dairy husbandry at Pennsylvania State College, Sept. 27.

» HARRY M. FREER, 62, director of W. E. Long Co., Chicago, former operator of Akron (Ohio) Baking Co. and treasurer for a number of years of Standard Baking Corp., Chicago, Sept. 29.

» FRED C. MANSFIELD, 69, president of Fred C. Mansfield Co., condensery operators, at Watertown, Wis., Sept. 22.

» CHARLES E. MCFARLAND, 46, owner of Independent Packing Co., Houston, Texas, Sept. 16.

» ROBERT MCVICKAR, 76, retired New York branch manager of Kingan & Co., with which company he had spent 51 years, at New York, Oct. 4.

» FRANK E. NORTON, 41, manager of Wilson & Co.'s Chattanooga branch, recently.

» J. J. ROGERS, 72, secretary-treasurer of Indiana Canners Association, at Pendleton, Sept. 22.

» WILLIAM F. SABATH, 76, formerly head of the Galveston branch of Anheuser-Busch Inc., Oct. 9, at St. Louis.

» HENRY SCHEMMEL, 72, president of Central Wisconsin Canneries and director of Minnesota Valley Canning Co., Rochelle Asparagus Co. and Northern Illinois Canning Co., at Cambria, Wis., Sept. 22.

» CAMILLE J. WEBRE, 54, vice-president and general manager of United Salt Corp., Houston, Texas, Oct. 4.

Associated Industries

» AMERICAN CAN CO., New York, has established a branch sales office of its packers can department at Indianapolis.

» FILTER PAPER CO., Chicago, has moved into larger quarters.

» FRUEHAUF TRAILER CO. will construct two additions to its main plant in Detroit.

» HOMESTEAD VALVE MANUFACTURING CO., INC., has appointed as distributors of its Hypressure Jenny: General Auto Supplies, New Albany, Ind.; Grinold Auto Parts, Inc., Hartford, Conn.; Automotive Equipment Supply Co., St. Louis; Cummings & Emerson, Peoria, Ill.

» OWENS-ILLINOIS GLASS CO. has appointed R. E. Delaplane assistant sales manager of its closure division.

» KRON CO. has appointed J. A. Hunt Co., Philadelphia, district representative.

» LINCOLN ELECTRIC CO. has named William C. Carter and Edward J. Burnell vice-presidents.

» LINCOLN ELECTRIC CO., has named F. M. Maichle manager of its Detroit arc welding sales-engineering office, and W. R. Persons manager of its Pittsburgh welding sales-engineering office.

» MACK TRUCKS, INC., Long Island City, N. Y., has promoted L. C. Josephs, Jr., chief engineer, to vice-president and a member of the board.

» MILPRINT, INC., has appointed E. William Ardern representative in its upper New York territory.

» CHARLES STOLLBERG, retired vice-president of American Can Co., died Oct. 21, in New York, at the age of 77.

FROM BIG TO LITTLE

MANUFACTURERS of food products are adopting our adjustable wrapping machines in constantly increasing numbers, because of the important production and merchandising advantages which these versatile machines offer.

In plants where volume on one size package is not large enough to justify machine wrapping, an adjustable machine may be installed to wrap all the various sized packages—thus obtaining the economies of machine production.

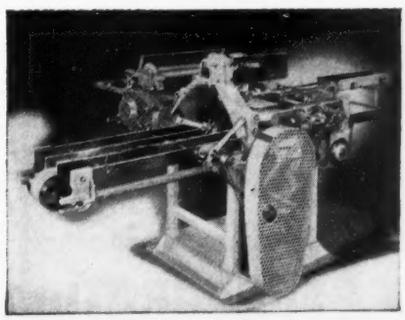
The ability to handle numerous sizes is but one advantage of our modern machines. Most of them can be adapted to handle many different types of material —transparent cellulose, printed paper wrappers, glassine, foil, etc. And when equipped with the Electric-Eye registering device, this material may be in roll form, making a large saving over cut-to-size sheets.

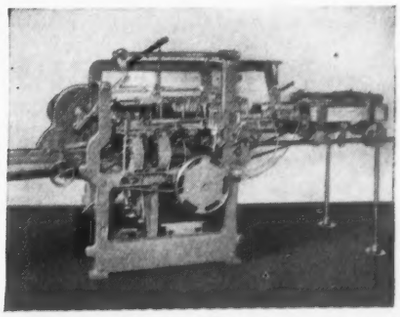
CHECK UP

Compare your present wrapping methods with the advantages offered by our adjustable machines and see what it would mean to you. We will be glad to give you the benefit of our recommendations. Get in touch with our nearest office.

Literature on request

PACKAGE MACHINERY COMPANY, Springfield, Massachusetts
NEW YORK CHICAGO CLEVELAND LOS ANGELES
Peterborough, England: Baker Perkins Ltd. Mexico, D. F., Apartado 2303.
Buenos Aires, Argentina: David H. Orton, Paipu 231.
Melbourne, Australia: Baker Perkins Pty., Ltd.





PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Determining Coverage Value of Chocolate Coatings

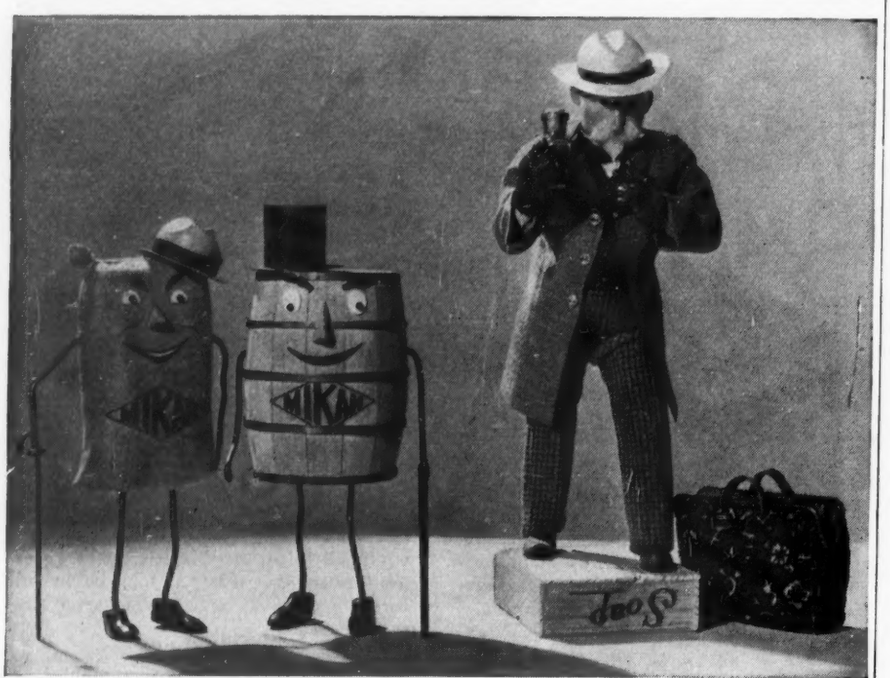
(*Continued from page 631*)

touching the surface of the chocolate with a spoon, spatula, or knife blade a normal level can easily be obtained for the determination.

When the temperature of the sample to be tested is above the 95 deg. F. testing temperature, slightly less chocolate than is needed may be cooled to the testing temperature. A small quantity of the sample at the higher temperature may be used to bring the chocolate up to the level for the required depth of immersion. After some experience is had by the operator, the error introduced by this shortcut is negligible and much time is saved by this modification of procedure.

When the room temperature is unusually low, cooling the chocolate to 1 or 2 deg. F. above the testing temperature is advisable. The temperature should then be checked after the test is completed.

With the exception of those above 200 deg. MacMichael, viscosities are recorded and reported as read under the conditions proposed in this article. When under exceptional circumstances a smaller depth of immersion is used, the viscosity is recorded as estimated by multiplying with a factor to express a result for the normal 3 cm. depth of immersion. However, the result obtained in this manner is not entirely correct.[3]



Performance Vs. Ballyhoo

The old-time medicine doctor could claim anything for his concoctions — and usually did. He was always gone the next day, anyway.

For nearly half a century, Mikah Glues have served all branches of the food industries, faithfully and dependably, standing on a record of performance that means more than any extravagant claims.

National Adhesives Corporation

New York — Chicago — Philadelphia — Boston — San Francisco
and all Principal Cities

Recent Advances in Brewing Technology

(*Continued from page 649*)

vaulted ceilings to prevent possible drippage of condensate, but in many cases condensation has been eliminated by maintaining a positive pressure of fresh pure air at 90 deg. F.

Steel storage tanks are replacing tanks of wood, the steel being either glass-enameled or coated with wax or bituminous plastic compounds. The tanks are supported directly by the building-structure columns and are built up in tiers, access being gained by catwalks in place of floors. Where plastic coatings are employed, the composition of the steel used in fabricating the tanks is important. This should be flange steel of low ductility and of the following analysis:

Carbon,	0.22	per cent;
Manganese,	0.39	per cent;
Phosphorus,	0.012	per cent;
Sulphur,	0.030	per cent.

Supporting steel tanks directly on the H columns and members of the building construction raises the question of deflection. In one instance this has been less than 1/16 in. Four-point support of steel tanks also permits the construction of buildings with floor systems calculated only to carry light live loads, as the heavy loads are conveyed directly into the steel members and columns. Multiple-support tanks require designing of floor systems conveying live loads of 500 lb. per sq.ft., whereas four-point suspension requires floor loads of 100 lb. or less, resulting in considerable saving in building-construction costs.

Several brewers are using concrete fermenting and storage tanks lined with a substance similar to Bakelite. The one weakness of concrete storage tanks is their failure to withstand pressure in excess of 10 lb. per sq.in.

The brewing industry has been built on a solid foundation of scientific research which has paid dividends. Today, brewing is the seventh ranking industry in the United States and will this year produce 60,000,000 bbl. (1,860,000,000 gal.) of beer.

(*Continued from page 665*)

MEAT

Quick Tests for Amount of Creatinine in Meat Extracts

CREATININE IN MEAT EXTRACTS is important because its amount is, to a certain extent, an index of strength and quality of the extract. After pure food laws began to take cognizance of this fact, by demanding a minimum creatinine content in the solid matter of meat extracts, it became still more important for the maker and also for government inspectors, to have at their command a rapid, convenient yet reliable test for creatinine. The color tests, in which the sample undergoes a color reaction and is then compared with a series of known specimens of gradually increasing color intensity, rank high in convenience but do not give extreme precision. For the practical needs of meat packers and inspectors, however, their accuracy is quite adequate. So a number of these color tests have been carefully compared to select the most suitable procedure, reagent and instrument. The Duboscq-Hellige color comparator was found satisfactory both in convenience and accuracy.

Three color reactions were found acceptable, the reagents being picric acid, potassium permanganate and lead acetate. Of these, the picric acid reaction (Folin method) proved to be the most suitable for the present purpose. The preferred procedure is simple and takes little time: To 5 cc. of sample add 4 cc. of 30 per cent of aqueous sodium hydroxide and 20 cc. of saturated aqueous picric acid, shake well, let stand five minutes, fill up to mark in the comparator tube, and take the reading in the colorimeter.

Digest from "Determination of Total Creatinine in Meat Extracts," by Lucio Zanni, *L'Industria Italiana delle Conservi Alimentari 12*, (No. 2), 21, 1937. (Published in Italy.)

OILS & FATS

Better Materials of Construction for Oil Processing Equipment

THE TECHNOLOGY OF OIL PROCESSING has progressed far since the early days when copper, without any protection from corrosion, was considered the best metal for oil kettles. Iron is more durable, and rust is less toxic than the copper soaps formed by corroding copper. But modern alloys offer a wide and adaptable range of metals which do not require tinning or other protective coatings. In addition to the stainless and rustless steels there are aluminum and its alloys.

For the soap manufacturer, nickel is also of special interest. Since these corrosion-resisting metals are more expensive than iron, the equipment designer can effect economies by confining their use to those parts of the apparatus which are exposed to corrosive influences.

Four sources must be considered, namely electrolytic corrosion (when two different metals come in contact), stray currents, chemical corrosion and attack at welded seams. There are particular parts of an autoclave or other apparatus which are especially susceptible to one or another of these corrosive influences. Making due allowance for these, the designer can use iron construction where it will serve satisfactorily and can provide the corrosion-resisting metal (either as solid construction or as a lining) where protection is needed. Modern fusion methods of applying metal linings to a different metal give perfect adhesion because the lining is made an integral part of the bimetal

KILL Bacteria!

Clean FIRST... then sterilize

Safeguard and Protect your Product from Contamination or Spoilage by Cleaning and Sterilizing Equipment and Utensils with Dependable Oakite Materials

You cannot be too careful about cleaning and sterilizing equipment and food handling surfaces. Product quality, flavor or even spoilage depends on the efficiency and thoroughness with which these daily and important operations are performed.

That is why we say . . . don't risk contamination of product . . . but clean equipment FIRST with dependable Oakite materials . . . then KILL BACTERIA by sterilizing with Oakite Bactericide. Modern Oakite cleaning and sterilizing materials help you consistently maintain high sanitary standards. In addition, they provide the advantages of economy, speed in cleaning and safety to equipment. May we send you FREE booklets with further interesting detail? No obligation . . . write today.

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OAKITE

TRADE MARK REG U.S. PAT OFF.

SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

structure. Where needed, the cheaper metal can be coated on both sides with the corrosion-resisting metal.

Digest from "Metals as Structural Materials in Equipment for Processing Oils and Fats," by Th. Hinko, *Oele, Fette, Wachse, Seife, Kosmetik*, 1937, No. 5, 7. (Published in Germany.)

SUGAR

Pure Grape Sugar

ACCORDING TO A RECENT GREEK INVENTION (covered by French Patent 807, 647, granted Jan. 16, 1937, to John Gheorgiou Marakas and claiming priority under three prior applications for Greek patents) highly purified glucose can be prepared from fresh or dried wine grapes by a simple and economical process in which tartrates and other unwanted impurities are removed before the syrup is evaporated. The raw syrup may be made from the fresh grape juice or from an extract of dried grapes. In either case, after the tartrates have been precipitated and removed, the syrup is evaporated down to a density of 40 to 42 deg. Bé.

When seeded with fine crystals this syrup gives a crop of crystals containing both glucose and levulose. Taking advantage of the greater solubility of levulose, the mixture is extracted with alcohol (which may be more or less diluted with water). The residue of glucose crystals is washed with the same solvent, centrifuged, and then treated with dry steam or hot air. Temperature control is essential in this operation because the crystals must not be melted. Finally the crystals are dried. This method permits the production of 99.5 per cent pure glucose.

MISCELLANEOUS

Selenium in Plants

SOME PLANTS absorb selenium from seleniferous soils to such an extent that it seems possible that selenium is important in the plant's physiology—especially since the same plant is rarely found on adjacent non-seleniferous soils. Most of these plants would be termed weeds.

Other plants, including common cereals, absorb moderate amounts of selenium but show a rather low tolerance for it. Still others, like certain forage grasses have so limited a tolerance that they scarcely grow at all in seleniferous soils.

Digest from "Selenium in Plants in Relation to Its Occurrence in Soils," by Miller and Byers. *Journal of Agricultural Research*, 55, 59, 1937.

Yeast Growing Costs Reduced

THE PRACTICE in respect to volume of liquids handled in the early and final stages of yeast growing and in number of fermenters used is reversed.

In the process covered by U.S. Patent No. 2,084,736 only a small volume of setting wort is used. As a result there is a worth-while reduction in the quantities of circulating air and cooling liquid required during the early stages of the yeast growing. Also, since the volume of setting wort is small, only one instead of several fermenters are needed. That fact makes possible the emptying and cleaning of the other fermenters during the early growing stages of each batch of yeast without interfering with the daily output of finished yeast.

By this method only 1/6 to 1/11 of the total quantity of concentrated yeast nutrient is put in the fermenter with water to give a 3 to 4 deg. Balling starting wort. The remaining 5/6 to 10/11 of the nutrient is added gradually with cold water as desired to give a vigorous yeast growth and to keep temperature in fermenter at the 28 deg. C. temperature and nutrient wort at the 3 deg. Balling concentration.

Thought for FOOD

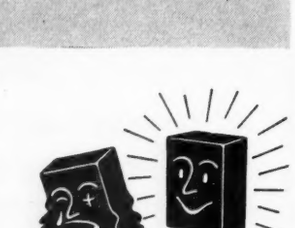
PURITY . preserved

"The nearer the still, the purer the alcohol" is another old saw from which Rossville has pulled the teeth—so to speak.
A dozen cleaning and inspecting operations that deserve the term "Scientific Meticulousness"—or better—is assurance that the Rossville 5-gal. can, 54-gal. tank or the 8000-gal. tank car, all carry STILL purity across your threshold. Doing the unusual has become a habit with Rossville. Foreign indeed, to Rossville Alcohol, is foreign matter, rust or impurity — distance traveled notwithstanding.

Mailed free: "ALCOHOL TALKS"—a monthly educational series on alcohol.

WE FIX FLATS

The flat tire is not confined to the highway or the drawing room—too often it enters the dining room and lets down a smooth running party. The crispy delicacy that has wilted by moisture is a flat. The granular palate tickler that has gone lumpy by moisture is another flat that can't be fixed.
Lacquered packages carry the product to the housewife in as good condition as it leaves your plant. Moisture stays out, flavor stays in and the package is impervious to the grime of handling.



Send for elaborate portfolio entitled "LACQUER COATING FOR MODERN MERCHANDISING"

TASTELESSNESS . is in good taste

"Taste the product . . . but not the closure" is a safe policy in food packaging. For example, take ketchup bottles . . . Resinox helped out with a molded dispenser cap that registered 100% on dispensing, but Zero on taste. Resinox molded closures are colorful, strong, non-fading, non-bleeding . . . and TASTELESS.

An instructive book containing data on molded closures is yours for the asking.

COMMERCIAL SOLVENTS CORPORATION
New York Central Building, New York, N. Y.

When the addition of the feed wort and water fills the first fermenter, half of the contents of that fermenter are run into a second fermenter and the addition of the feed wort into the two fermenters is continued. By the time the entire quantities of the feed wort and cold water have been added to all the fermenters required to hold the complete batch, the growing of yeast in each fermenter has proceeded in a uniform and normal manner with a lessened expenditure of power for circulating the aerating air and with less demand for cooling water to keep temperature of fermenter contents at 28 deg. C. Under this procedure one fermenter suffices for about 40 per cent of the total growing and maturing time.

The patent is assigned to National Grain Yeast Corp., Belleville, N.J. by the patentees, Sebastian Lutz and Robert Roy Irvin, Bloomfield, N.J.

Pudding Preparations

READY PREPARED PUDDING PASTES which are easily soluble are made by mixing a fondant sugar solution with a melt of drop sugar and blending this mixture with corn starch or rice starch. Caramel, nuts, jams, fresh fruits, egg white or yolk or any suitable mixture of these may be used for flavoring. The proportions are chosen so that when the mixture cools it forms a stiff paste. Variations on this basic method, as described in British Patent 455,261 (granted Jan. 7, 1937 to A. van Dantzig), include making a hard mass instead of a paste. This is accomplished by adding the fondant sugar directly to the drop sugar melt instead of using a water solution. This product can be cut in pieces of the desired dimensions for packaging. The drop sugar melt may be made either by melting sugar directly, at 122 deg. C. (251 deg. F.), or by adding a little water and boiling the melt down at 125 deg. C. (257 deg. F.). Partial replacement of the sugars by glucose from starch is permissible.

New Method of Preparing Dried Egg White

A NEW METHOD of preparing egg white for drying has been developed in the U.S. Department of Agriculture. A public service patent has been applied for to make it available to anyone in the United States.

Fresh egg white consists of a thick, jelly like mass, called the "thick white," and a thin, comparatively mobile, liquid called the "thin white." To dry the entire white successfully in a commercial way necessitates first liquefying the "thick white." Otherwise it dries hard and will not dissolve in water. Ordinarily, thinning the thick white is done by "fermenting" the whites for several days at room temperature in vats.

The resultant thinning is caused by breakdown of egg protein by enzymes natural to the egg. It is pretty much the same as the thinning of the white that occurs in cold storage. The growth of bacteria during fermentation seems to have no good effect.

The new method of thinning is to add a little enzyme (trypsin), about 1 part to 10,000, and hold the batch in cold storage at 4 to 6 deg. C. (39-43 deg. F.). Then it is ready to dry. Furthermore, it is practically bacteria free because the bacteria seem to die off under these conditions. Baking tests show that egg whites prepared in this way make a slightly better angel-food cake than dried fermented whites. And the authors believe that in egg drying factories there can be better control and considerable saving of fermentation time by the new method as compared to the old.

Digested from "Dried Egg White," by A. K. Balls and T. L. Sevenson. *Food Research* 1 319, 1936.

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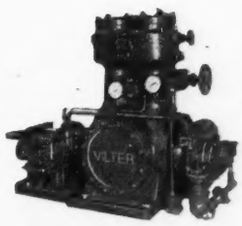

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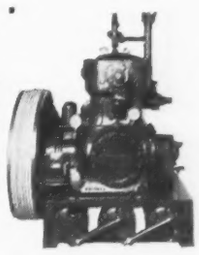

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Coffee Extract

COMMERCIAL EXTRACTS sold as coffee extracts are generally made with a cane sugar base (part or all of which may be caramelized) and sometimes rely entirely on chicory for the coffee flavor. The better grades use coffee extract. The poorer qualities may substitute glucose for cane sugar as well as chicory for coffee. A caramelized cane sugar base, to be entirely satisfactory, should be prepared by heating the sugar (which may be blended with a moderate quantity of glucose or corn syrup) 10 minutes at 185–190 deg. C. (365–383 deg. F.), then pouring directly into sufficient cold water so that the concentration of the resulting solution will be 60–70 per cent. Heating for 30 minutes has been recommended but is unnecessary and even undesirable for preparing caramel of the required flavor, color and aroma. The caramel should give a negative result in the alcohol test, give no precipitate with semibasic lead acetate, and contain not more than about 1 per cent ash in a 70 solution.

Excessive use of glucose or corn syrup can be detected by the alcohol test (granular precipitate) and the semibasic lead acetate test (precipitate). Coffee extracts with a molasses base have a high ash content. Adulteration with honey is also easy to detect, but is not to be expected under present price conditions. Chicory can be detected by measuring the fructose: glucose ratio, and by the ferric chloride test which reveals the tannins of coffee (if coffee is present) but will be negative or weak if little or no coffee was employed.

Digest from "Examination of Coffee Extract," by J. Dhont, *Chemisch Weekblad* 34, 522, 1937. (Published in Germany.)

Coffee Extract Chromatograms

CHROMATOGRAPHIC ANALYSIS, increasing its range of usefulness in the examination of food and drug products, has been successfully applied to extracts of whole coffee, decaffeinized coffee and coffee substitutes such as those made from malt. First, in the simple chromatogram obtained with pure alumina as the powdered adsorbent, there is no distinction between whole and decaffeinized coffee but a sharp distinction between these and malt coffee. This is true in ultraviolet light as well as in daylight. Then, when the chromatogram is developed with acetone, decaffeinized coffee gives a distinct result, differing from that given by whole coffee. Caffeine and chlorogenic acid can be leached out of the adsorbent with water. Even with decaffeinized coffee, the aqueous filtrate contains chlorogenic acid and further quantities appear in the alkaline extract, probably as chlorogenic esters. Quinic acid, assumed to be a decomposition product of chlorogenic acid, was not found in any of the extracts. If it is desired to use the chromatogram for quantitative determination of caffeine, as in testing the quality or purity of coffee samples, the adsorbent is leached with water, the water is evaporated, the residue is extracted with chloroform and the caffeine is weighed.

Digest from "Chromatographic Adsorption Analysis in Pharmacy: Examination of Coffee Extracts," by H. Valentin, *Pharmazeutische Zeitung* 82, 527, 1937. (Published in Germany.)

To Prolong Fertility of Eggs

IT HAS BEEN KNOWN for some years that eggs retain their fertility longest if they are stored at a temperature of 10 deg. to 12 deg. C. Experiments during the past year have indicated that, at 10 deg. C., the period of fertility can be still further prolonged if the atmosphere contains 2½ to 5 per cent of carbon dioxide.

Digest from *Report of the Food Investigation Board for the year 1936.* (Published in England.)

ORGANIZE YOUR PRODUCTION
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THE limits of technology are soon reached in practically every process in the food industries. If production is expanded only by adding equipment or space or workers, the reduction of costs which should follow increased volume is not obtained. What, then, can be done?

The answer is only to be found in the Continuous Flow Principle of Handling Materials—embodied in practical form in Mathews Conveyer Systems.

The past 30 years have proved that production in all industries can be revolutionized by applying this organizing principle; which is the only way to integrate many separate processes or operations into one efficient unitary process of production.

The Mathews Principle of Continuous Flow provides an absolute (instead of merely a relative) standard of efficiency for factory operation.

As applied by Mathews engineers, it eliminates congestion and bottle-neck, brings about the maximum overlapping or simultaneous performance of processes and speeds materials through the plant in minimum time, thus reducing inventories, improving quality and freshness and yielding maximum turnover and profit.

The first step is to ask for a survey by an experienced Mathews field engineer.

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BOOKS RECEIVED

THE CANNING CLAN. By Earl Chapin May. Published by MacMillan Co., 60 Fifth Ave., New York, 1937. 487 pages; 6x8⅝ in.; cloth. Price $3.

For years the canning industry has been waiting for some one to produce such a history as this of canning in the United States. Old timers who remember the early days or the reminiscences of still older men are fast passing on. Mr. May did not start his two-year task a moment too soon. With his background of rare journalistic ability and an industry which apparently he loves, he has produced a fascinating, yet authentic, tale of a very important chapter in American business.

Obviously, to compress the events of a century of experience of so huge an industry as canning into a single volume has required the selection of a viewpoint and an angle of attack. Mr. May tells his story as a business drama of the lives of the men who have built up the industry to its present size. It is a business story about business men, and the fundamentals of business were the same in the old days as they are today.

EXPERIMENTAL COOKERY (Second Edition). By Belle Lowe, Professor, Foods and Nutrition, Iowa State College. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York., 1937. 600 pages; 6¼x9¼ in.; cloth. Price $4.50.

Written primarily as a text for experimental cookery courses in colleges, this book contains information of value to scientists in the research and development departments of food-manufacturing companies. It presents recent knowledge of food preparation on a chemical and physical basis, particularly that of colloid chemistry. The book covers sugar cookery, freezing, jelly, gelatine, meat, emulsions, milk and cheese, egg cookery, flour and bread, batters and doughs, and fats and oils, and it includes a chapter on colloid chemistry.

BUSINESS UNDER THE NEW PRICE LAWS. By Burton A. Zorn and George J. Feldman. Published by Prentice-Hall, 70 Fifth Ave., New York, 1937. 463 pages; 6¼x9¼ in; cloth. Price $5.

What can and what cannot be done under the Robinson-Patman Act and State anti-price discrimination laws is covered, and examples are given showing the application of the R-P Act to typical business situations. It is, of course, impossible for any authority to say exactly what is legal and what isn't, because the Federal Trade Commission is still formulating decisions in "test" cases. But the discussion of the factors involved should be helpful in establishing sales policies.

YOUR DIET AND YOUR HEALTH. By Morris Fishbein, M.D., Editor, *Journal of American Medical Association*. Published by Whittlesey House, 330 West 42nd St., New York, 1937. 298 pages; 5¾x8¼ in.; cloth. Price $2.50.

Food processors and distributors who want to know how products of the type which they handle fit into the balanced diet, and what effect they have on the health of consumers, will find this book helpful. Similar information on competing foods is, of course, included in the work, which was written primarily for consumers.

WHY LO-BAX IS A DEPENDABLE STERILIZER

FOR sterilizing surfaces with which dairy and other food products come in contact, you require a dependable, quick-acting bactericide. Your bactericide must also, of course, be safe, convenient and low in cost.

How does Lo-Bax meet *all* these vital requirements?

In the first place, extremely low alkalinity and high chlorine "availability" make Lo-Bax unique among sterilizers for speed and dependability in killing bacteria. The quick solubility of Lo-Bax, moreover, renders positive results doubly sure. For at the end of only one minute, Lo-Bax solutions are up to full strength and ready for use. There are no undissolved, concentrated particles to cause corrosion.

Lo-Bax is easy to use—just add it to water by the spoonful as needed. Lo-Bax is low in cost—one bottle (1¾ lbs.) makes more than 1,000 gallons of clear, 100-p.p.m. bactericidal rinse solution.

Why not let Lo-Bax help you maintain low bacteria counts? Write for full information today.

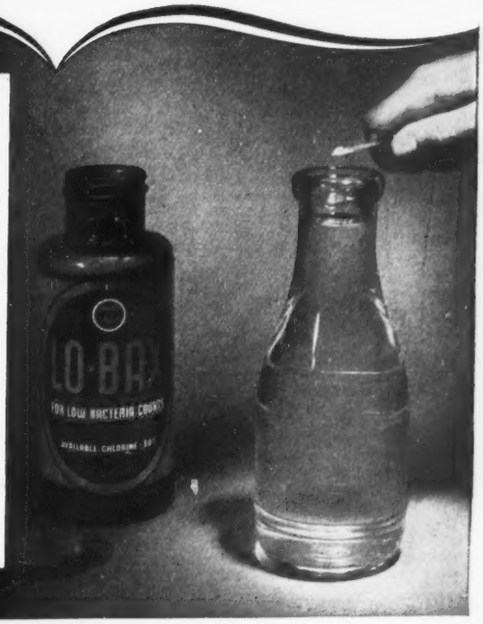
Make This Test—Prove to yourself that Lo-Bax dissolves faster

Fill a milk bottle up to an inch from the top with ordinary tap water. Pick up a small amount of Lo-Bax on a knife blade and drop it slowly onto the water.

Now notice how the fine Lo-Bax powder floats for a moment on the surface and then gradually settles through the water, dissolving as it goes. Watch the particles break up and completely dissolve as they slowly descend, see them disappear even before they reach the bottom. Test the chlorine in the resulting solution and prove to yourself that Lo-Bax makes full strength solutions in less than one minute.

After you've watched Lo-Bax go into solution, make this same test with a similar product. Watch the coarser particles nose-dive for the bottom, remain there undissolved, inert. Time how long it takes you to break up these particles and stir them into solution.

Then consider what the full strength solutions quickly secured with Lo-Bax mean to you in added convenience and more positive results--what this superior solubility means in safety from corrosion!



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THE RELATIVE TOXICITY OF INSECT FUMIGANTS. By H. H. Shepard, D. L. Lindgren and E. L. Thomas. Published by University of Minnesota Agricultural Experiment Station, St. Paul, Minn. 1937. 23 pp.; 6x9 in.; paper. Free. Report of study in which killing power of leading insect fumigants, as well as some of the newer ones. was measured.

ANALYSIS OF STATE UNEMPLOYMENT COMPENSATION LAWS. Published by Social Security Board, 1937. 23 pp.; 17x11 in.; paper. Price, 15 cents. Sold by Superintendent of Documents, Washington, D.C. It contains the most significant provisions of State unemployment compensation laws as interpreted by rules and regulations of State agencies.

1936 REVIEW OF UNITED STATES FOREIGN TRADE IN GRAIN AND RELATED PRODUCTS. By Ruth Spencer, Chief, Grain and Flour Section, Foodstuffs Division, Bureau of Foreign and Domestic Commerce. Published by Department of Commerce, Washington, D.C., 1937. 20 pp., mimeographed; 8x10½ in.; paper. Free.

PATENTS

Starch Made From Corn by Wet Process in Which Process Waters Excepting Steep Water are Refused—Frederick L. Jefferies, La Grange, Ill., to International Patent Development Co., Wilmington, Del. No. 2,088,706. Aug. 3, 1937.

Skins of Fish For Canning Made Firm and Non-adhesive by Soaking in Brine Made of Salt, 1 to 5 Per Cent Calcium Chloride, and 0.33 to 1 Per Cent Vinegar—Charles S. Ash and Per Berglund to California Packing Corp., San Francisco, Calif. No. 2,088,831. Aug. 3, 1937.

Fruit Juices Freed From Solids in Continuous Manner by Contrifugal Force—Nils Edvin Svensjö, Alsten, Sweden, to DeLaval Separater Co., New York, N. Y. No. 2,089,043. Sept. 3, 1937.

Molasses Concentrated to Solid at Normal Temperatures by Drying in Thin Film on Heated Moving Inner Surface—Alfred C. Hougland. St. Paul, Minn. No. 2,089,062. Aug. 3, 1937.

Roasted Coffee Given Three-Step Grinding Treatment—Payson MacKaye, Yonkers, N. Y., to Jabez Burns & Son Inc. New York, N. Y. No. 2,089,065. Aug. 3, 1937.

Tomato Juice Separated From Pulp Stock by Two-Step Operation—George L. Roberts, to Food Machinery Corp., San Jose, Calif. No. 2,089,071. Aug. 3, 1937.

Molasses Vacuum Dried While Given Heat Treatment on Inner Surface of Rotating Cylinder—Alfred C. Hougland, St. Paul, Minn. No. 2,089,093. Aug. 3, 1937.

Raw Coffee Beans Freed From Chlorogenic Acid by Organic Solvents After Opened Beans Have Been Given Heat Treatment to Crack Chlorogenic Acid—Hanns Dyckerhoff, Munich, Germany. No. 2,089,116. Aug. 3, 1937.

Egg Meats Filtered at High Production Rate to Remove Egg-Shell Fragments and Similar Solids—Frank B. Lomax, Chicago, Ill. Nos. 2,089214 and 2,089,215. Aug. 10, 1937.

Sugar Syrups Stabilized Against Loss of Moisture and Separation of Sugar Crystals Through Addition of From 5 to 10 Per Cent Dextran—James Cyril Mahoney, Manila, P. I. No. 2,089,217. Aug. 10, 1937.

Vinegar Made in a Closed Top and Bottom Generator Having a Concave Bottom Floor Through Which a Plurality of Perforated Air Tubes Extend Upwardly Into Coke Packing—Charles H. Owens, North Arlington, N. J. No. 2,089,412. Aug. 10, 1937.

Non-Sweating Margarine Made Through the addition of Lecithin and a Diglyceride of a High Fatty Acid—Albert K. Epstein and Benjamin R. Harris, Chicago, Ill. No. 2,089,470. Aug. 10, 1937.

Citrus Fruits De-seeded by Mechanical Means—Ralph Polk Jr., Haines City, Fla. Nos. 2,089,501 and 2,089,503. Aug. 10, 1937.

Peel Removed From Citrus Fruits in Sections by Mechanical Action—Ralph B. Polk, Haines City, Fla. No. 2,089,502. Aug. 10, 1937.

Pastry Cups Formed Mechanically—Ward W. Turnbull, Chattanooga, Tenn. No. 2,089,675. Aug. 10, 1937.

Egg Meats Filtered Without Formation of Foam—Frank B. Lomax, Chicago, Ill. No. 2,089,702. Aug. 10, 1937.

Sugar Crystals in Centrifugal Basket Washed by Spray from Nozzle Oscillating Vertically Without Stop at Upper and Lower Points of Travel—Verne V. Long, Torrington, Wyo. No. 2,089,906. Aug. 10, 1937.

Excess Pastry For Filling Ice-Cream Cone Molds Recovered For Re-use—Sol. S. Leaf and Regolo Panza to Milko Cone and Baking Co. Inc. Chicago, Ill. No. 2,089,923. Aug. 10, 1937.

Candy Pieces Cut Into Desired Lengths by Mounted Wires Moving Downward Against Candy Mass as it Comes From Horizontal Outlet Spout—George K. Bainbridge, Ripon, Calif. No. 2,090,095. Aug. 17, 1937.

Traveling Tray Oven With Loading and Unloading Door Below Level of Baking Compartment and Spray Jets Just Above Loading Opening to Steam Bakery Goods With Upward Movement of Trays—Frederick A. Hoppe, Chicago, Ill. to Fish Rotary Oven Co., Beloit, Wis. No. 2,090,204. Aug. 17, 1937.

Pretzel Dough Cut Into Strips Mechanically and Fed to Pretzel Forming Machine—Harrison S. Gipe, York, Pa. to Quinlan Pretzel Co., Reading, Pa. No. 2,090,291. Aug. 17, 1937.

Bread Dough Twisted by Mechanical Means—Frank Streich, 1/3 to Caleb H. Canby Jr. and 1/3 to H. Hoyt Thompson, Chicago, Ill. No. 2,090,379. Aug. 17, 1937.

Lecithin Hydrate Made By Treating a Lecithin-Containing Material With Water and Alcohol—Albert A. Lund, Port Washington, N. Y. No. 2,090,537. Aug. 17, 1937.

Eggs Broken and Separated Into Shells and Meats by Mechanical Means—Charles W. Reese to Reese Patents Corp., Los Angeles, Calif. No. 2,090,963. Aug. 24, 1937.

Milk Dried by Method in Which Gas is Used to Agitate and Driven-Off Water Vapor is Used in Heat Exchanger to Heat Up Incoming Milk—David D. Peebles, Eureka, Calif. No. 2,090,984. Aug. 24, 1937.

Milk Evaporated Under Pressure Below Its Vapor Pressure Prior to Passing at High Velocity Through Heating Zone With Subsequent Separation of Liquid and Vapor, and Complete Removal of Separated Liquid From Evaporating System—David D. Peebles, Eureka, Calif. and Paul V. Manning, Berkeley Woods, Calif., to David D. Peebles. No. 2,090,985. Aug. 24, 1937.

Milk Converted to Plastic Mass Through Addition of 11 Lb. of Invert Sugar to 100 Lb. of Milk and Drying in Thin Layer at Temperature of 270 Deg. F. For 4 Seconds—Carrold A. Iverson to Iowa State Colege Alumni Association Inc., Ames, Iowa. No. 2,091,149. Aug. 24, 1937.

Foods Sterilized at Pressure Greater than Atmospheric While in Chamber of Can Sealing Machines by Insertion of Hot Electrodes Into Contents of Cans Prior to Sealing—Charles O. Ball, River Forest, Ill., to American Can Company, New York, N. Y. No. 2,091,263. Aug. 31, 1937.

Curd Tension in Hard Curd Milk Reduced Through Use of Intense Compressional Wave Vibrations—Leslie A. Chambers, Boston, Mass., to William H. Ashton, Edgemont, Pa. No. 2,091,267. Aug. 31, 1937.

Dehydrated Fruit With High Content of Fructose Sugar Put Into Dry and Distended Condition Without Sugar Deterioration by Heating Short Time in Chamber Under Atmospheric Pressure, Releasing Pressure, Continuing Heating Under Vacuum and at Temperature Below Inversion Point of Fructose—Charles C. Moore, San Francisco, Calif. No. 2,091,372. Aug. 31, 1937.

Increased Yield of Dextrose From Starch Hydrolyzation by Adding an Inorganic Salt to Hydrol Residue—Julian K. Dale to A. E. Staley Manufacturing Co., Decatur, Ill. No. 2,091,433. Aug. 31, 1937.

Whey Containing Locust Bean Gum Given Lower Viscosity by Treatment With Enzymatic Substance that Makes the Gum Soluble—Forest H. Clickner to Kraft-Phenix Cheese Corp., Chicago, Ill. No. 2,091,629. Aug. 31, 1937.

Potato Slices Washed Free of Starch Particles in Automatic Potato Chip Making Unit—Joseph D. Ferry, Harrisburg, Pa. No. 2,091,675. Aug. 31, 1937.

Sugar Crystals Washed Free From Coating of Molasses With Saturated Solutions of Sugar of Lesser Purity Than the Sugar Washed—Pedro Sanchez, New York, N. Y. No. 2,091,690. Aug. 31, 1937.

Corn Sugar Purified by Crystallizing in a Cyclic Operation—John M. Widmer, Cedar Rapids, Iowa, to Penick and Ford, Ltd., Inc., New York, N. Y. No. 2,091,900. Aug. 31, 1937.

Iron Content of Milk Increased Electrolytically—John H. Fedeler, New York, N. Y. No. 2,092,057. Sept. 7, 1937.

Whole Citrus Fruits Given Treatment With Bleaching Agent to Reduce Excess Coloring Material Around Stem Portions of Fruits—Jagan N. Sharma, Riverside, Calif., to Food Machinery Corporation, San Jose, Calif. No. 2,092,090. Sept. 7, 1937.

Color of Whole Citrus Fruits Intensified by Addition of Water Soluble and Oil Insoluble Amino Dye—Jagan N. Sharma, Berkeley, Calif. to Food Machinery Corp., San Jose, Calif. No. 2,092,091. Sept. 7, 1937.

Doughnuts With Edible Inner Core Formed by Wrapping Doughnut Dough Around Premade and Pre-shaped Edible Core Preliminary to Frying in Deep Fat—Adolf Haverlander, New York, N. Y. No. 2,092,160. Sept. 7, 1937.

Candies Having Decorated Easter Egg Appearance Made with a Plurality of Outer Layers of Hardened Liquid Coatings of Which One is a Thin Flexible Gelatin Sheet Carrying the Decorations—Horace E. Cosler, Evanston, Ill., to National Candy Company, Inc., St. Louis, Mo. No. 2,092,273. Sept. 7, 1937.

Cream or Milk Given Periodic Temperature Treatment Alternating Between Below and Above Solidification Point of Butter-Fat With Final Temperature Between 50 and 75 Deg. F. to Obtain Maximum Increase in Viscosity After Ageing—John H. Nair, and Donald E. Mook, Syracuse, N. Y., to Borden Company, New York, N. Y. No. 2,092,325. Sept. 7, 1937.

Canned Foods Given Zone Heat Treatment During Progressive Passage Through Horizontal Sterilizing Unit—Albert R. Thompson, to Food Machinery Corp., San Jose, Calif. Nos. 2,092,433 and 2,092,434. Sept. 7, 1937.

Low Capacity Doughnut Cooking Machine—Charles E. Carpenter, Chicago, Ill., to Givaudan-Delawanna, Inc., New York, N. Y. No. 2,092,499. Sept. 7, 1937.

Butter, Honeycomb, and Honey Made Into Stable Homogeneous Mixture—Anna S. and Harry A. Lipson, Cleveland Heights, Ohio. No. 2,092,518. Sept. 7, 1937.

Sterilized Tomato Juice Beverages Made From Tomatoes Crushed in Continuous Manner in Closed Pulping and Sterilizing System—Edward D. Eberts to Stockley Brothers & Co., Indianapolis, Ind. No. 2,092,729. Sept. 7, 1937.